

MODEL AIRPLANE NEWS

11th Year of Publication

APRIL, 1940

20c



The Boulton Paul "Defiant"

BURD

Consistent (CONTEST WINNERS)

40" SUPER-FORMER

A new satellite making a name in contest circles. Extra full with more than the necessary materials to complete the model..... **50c**



COMPLETE 10c



NO. 22
SKI-KLIMER



NO. 27
CLOUD HOPPER

Two beginners models guaranteed to fly. ABC method of construction. Sets complete in all respects. **10c**
SOLD THROUGH DEALERS ONLY!

BURD CONTEST WINNERS—

should not be confused with ordinary flying models. These models are not just drawn on the board as many so-called contest models are. BURD models are designed, test flown and proven through actual competition. Get the best. Get the original. BURD contest winners can be had at your dealer's!

BARGAIN

Terrific value—splendid performance! Worth 50c ordinarily priced as a special item to fit your pocketbook. Bugged construction and features found only in high priced models.



COMPLETE 10c

the SKYBURD WINGSPAN 30"

TRADE MARK REG. U.S. PAT. OFF.

SOLD ONLY THROUGH DEALERS! NOT SOLD DIRECT

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BURD RUBBER DURATION MODELS HAVE MORE CONTESTS THAN ANY OTHER MANUFACTURED LINE IN THE WORLD!

A bold statement but true! Check the results at contests and you'll see BURD models win. Get *proven* performance. Don't take someone else's word for it. Insist on BURD at your dealer's.

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Designed by technicians skilled in producing models which can be built and really fly. For beginners—flying satisfaction... for experts—superior performance. Together they make BURD the popular favorite. Ask your dealer for BURD models.

proven **BURD** champions

The THERMALIDER

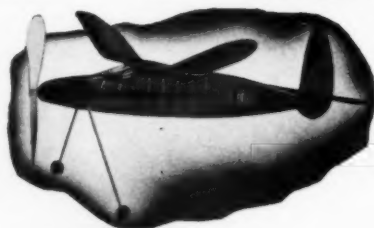
30" WINGSPAN 25c

15c extra if ordered direct

A leader at all contests. Can easily be constructed from the complete set furnished. Price formerly 50c, now, through BURD'S famous production, made available for 25c.



Dick Korda's WORLD RECORD HOLDER



BURD'S model of this amazing ship continues to make model history. Wins more contests than any other model made. No tricky adjustments necessary. Difficult balancing or construction. Best chances on one time winners. Get this BURD champion.

43" WINGSPAN
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BURD

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2113-2117 East Oliver St. Baltimore, Md.

Where the genuine (CONTEST WINNERS) are made

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"G" SERIES

OR BABY CYCLONE "F" SERIES

NO OTHER ENGINE CAN MATCH THIS LIST OF SUPER-CYCLONE FEATURES!

1. Most thoroughly designed and finest appearing engine on the market.
2. Rotary crank shaft admission valve.
3. One piece crank shaft, crank pin and counterweight integral, machined all over.
4. Full advance and retard ignition timer, the finest ever developed on any miniature engine.
5. Plunger lock on ignition timer.
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7. Twin spark—easy starting made easier.
8. Heavy duty ball bearing thrust with hardened steel races.
9. Hardened steel cam with non-slip prop drive.
10. Transparent fuel tank with large approved snap cover filler.
11. Suction gas feed, either upright or inverted.
12. 7/16" diameter main bearing of finest bearing metal obtainable.
13. Finest aluminum die castings the world affords.
14. Super light weight lapped in piston of special construction.
15. Positive ratchet lock on needle valve.
16. Correctly designed and proportioned flywheel with integral slotted drive, washer and nut included—\$1.25 each.
17. H sectioned aluminum alloy con rod with oversized bronze bearing inserts, bushed both ends.
18. Tubular hardened and ground full floating wrist pin.
19. Crank case has fins for air-cooling and appearance.
20. Removable exhaust stack.
21. No leaky clamp-on or screwed-on port covers.
22. Serviceable aircraft steel engine mounts for fire wall installation.
23. Screws and parts cadmium and nickel plated.
24. Six conversions to choose from.
25. Either dual or single ignition.
26. Upright models can be changed to inverted, or vice versa, without additional parts.
27. Cylinder may be turned 180 degrees for either right or left exhaust.
28. Needle valve seat may be changed to either side.
29. Timer assembly 180 degrees reversible—easy to get at spark lever.
30. Comes all mounted and wired ready to install.
31. Manufactured by an old established aircraft concern.
32. SUPER-CYCLONE will fly any kit now on the market—**WITH POWER TO SPARE**—yet light enough for small jobs.

COMPLETE AND READY TO INSTALL!—There are no extras to buy, every SUPER-CYCLONE engine is delivered complete and assembled with spark coil, condenser, transparent fuel tank and engine mounts. Type: two stroke cycle. Two port rotary admission valve. Transfer integral with cylinder. 1/5 to 1/4 horsepower. Bore 15/16", stroke 15/16". Displacement .647 cu. in. Weight bare, approximately 7 oz. Every engine thoroughly tested and given full throttle run. Sixty day guarantee against defective materials or workmanship.

SUPER-CYCLONE IS OUT OF THE TOY ENGINE CLASS—and is a masterpiece of precision engineering. Our cylinders and pistons are individually lapped units, and have been so constructed during all our years of manufacturing.

BUY DIRECT—We have no dealers in the United States. The low price of this sensational new engine is the result of buying direct from the manufacturers, whose production methods and tremendous volume of sales permit them to offer you this great value.

SUPER-CYCLONE DUAL IGNITION—A special coil fires both plugs simultaneously. In the event one should foul or a spark lead should become disconnected, engine continues to run on the other plug.



Our successful experience in the building of the preceding models of Baby Cyclone has enabled us to produce in the SUPER-CYCLONE the finest example of miniature engine engineering ever placed on the market at any price! It is an entirely new engine, with more sensational features and precision construction than any other engine, yet every improvement is based on a thorough knowledge of the problems involved. **MORE HORSEPOWER**—Using exactly the same propeller with all engines, SUPER-CYCLONE was tested against four of the most popular and well-known engines in the 1/5 Horsepower Class—SUPER-CYCLONE turned up over 1000 R.P.M. more than any other engine.

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Please send me items checked. I enclose POST OFFICE MONEY ORDER.

Super-Cyclone

With coil, condenser, fuel tank and engine mounts

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|--|---------|--|---------|
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Baby Cyclone

- | | |
|---|--------|
| <input type="checkbox"/> America's most popular engine for sport flying. Price will advance shortly to \$12.50. | \$9.00 |
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Model AIRPLANE News

11th YEAR OF PUBLICATION

VOL. XXII

No. 4

Edited by Charles Hampson Grant

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Say Goodbye to Motor Troubles

the 4 Cycle OVERHEAD VALVE motor IS HERE!



3 MODELS

20 c. c. 15 c. c. 10 c. c.



AIRPLANES



RACING CARS



BOATS

Patents Applied For

THE GREATEST DEVELOPMENT IN GAS MODEL HISTORY FOR POSITIVE STARTING...SMOOTHER OPERATION...MORE POWER!

2/3 H. P. GUARANTEED at 6,200 R. P. M. with Propeller!

YES, SIR! The Feeney 4-Cycle is the engine that thousands of gas modelers have wanted! For the first time in gas modeling history, hobbyists can have the advantages of 4-cycle, overhead valve operation that "has what it takes" to put planes, racing cars and boats in the championship class!

There's an *extra thrill* you never experienced before in store for you the first time you swing that model up to the line with a snug Feeney 4-Cycle installed. An *extra thrill* because you know you have the best power plant on the market—the kind that brings your model home ahead of the field!

4-CYCLE ADVANTAGES

Four-cycle, overhead valve construction eliminates starting failures... gives you absolute assurance your motor will start every time... increases engine life... and reduces plug firings 50%! Ends need for complete engine shutoff for radio controlled plane landings.

RATED H. P. GUARANTEED

Weighing but 15 ounces, the 20 c.c. model is guaranteed to furnish $\frac{2}{3}$ H.P. at 6,200 R.P.M. with propeller. H.P. of the other models is also guaranteed. You never before saw such a guarantee or such a low ratio of weight to horse power in a model engine!

YOU GET THREE ENGINES FOR LITTLE MORE THAN THE PRICE OF ONE

This is more than a "one purpose" engine. You can use it for all your model work! This month a 20 c.c. engine in your Class C or radio controlled ship... next month a 15 c.c. marine engine or a

HERE ARE SOME OF THE FEENEY 4-CYCLE FEATURES

- 4-Cycle, Overhead Valve operation.
- Guaranteed to turn up rated H.P. at 6,200 R.P.M. with propeller.
- Lowest weight ratio to H.P. on the market.
- Especially designed throughout—not a big engine cut down.
- Made of special alloys that eliminate problem of piston "freezing".
- Splash type lubrication with oil traps.
- over high pressure bearing areas.
- No needle valve to get out of adjustment.
- Model A—20 c.c. Disp. (1.2) cu. in. Bore—1-3/16 inches. Stroke—1-1/16 inches.
- Model B—15 c.c. Disp. (.92) cu. in. Bore—1-1/16 inches. Stroke—1-1/32 inches.
- Model C—10 c.c. Disp. (.6) cu. in. Bore—15/16 inch. Stroke—7/8 inch.

Send For Literature Showing Many Other Feeney 4-Cycle Features!

10 c.c. racing car engine. All you need are a few extra parts to convert your engine to either of the other two sizes!

FURNISHED IN KIT FORM, TOO!

If you want to take a hand in building your engine as well as your model—the kit is the answer. Not a "screwdriver" kit but easily finished if you can handle a lathe. All necessary parts including spark plug, coil and condenser, clear instruction and blueprints. Nothing else to buy. Priced at only \$13.75!

INVESTIGATE FEENEY 4-CYCLE BEFORE YOU BUY

Before you invest money in an engine for your model remember that cost isn't the only consideration... for only a little more than most 2-cycle engines you can have all the Feeney 4-Cycle features that you *can't get with any other model engine on the market*. Model A (20 c.c.) \$29.50—Model B (15 c.c.) \$29.50—Model C (10 c.c.) \$29.50. Send for complete information to Feeney Engine Company, Dept. 36, 2700 South Michigan Avenue, Chicago, Ill.

DEALERS! Write NOW for complete data, dealer information, prices, etc. Be first to show the Feeney 4-Cycle in your locality!

FEENEY 4-CYCLE

A REAL ENGINEERING ACHIEVEMENT

HOBBYISTS! MAIL THIS COUPON NOW! Orders Will Be Filled in the Order Received

FEENEY ENGINE COMPANY, Dept. 36,

2700 S. Michigan Ave., Chicago, Illinois

☐ Please rush complete information on the Feeney 4-Cycle Engine by return mail.
☐ I am enclosing ☐ Money Order ☐ Check as payment in full for ☐ Model A ☐ Model B ☐ Model C ☐ Engine ☐ Engine Kit. ☐ Send the item checked above C.O.D.

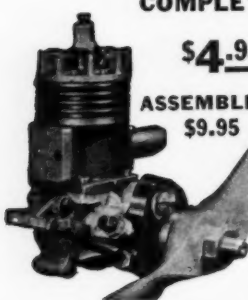
Name.....

Address.....

City.....State.....

COMPLETE KIT

\$4.95

ASSEMBLED
\$9.95

Everything is in the kit including Champion spark plug, coil, condenser, tank and cap, ignition wire, cylinder, piston, connecting rod, timer, crankshaft, all screws, nuts, bolts, complete instructions, etc. Every part is fully machined and finished. No oil, gas, batteries or propeller included. A SCREWDRIVER IS THE ONLY TOOL YOU NEED.

EXACTLY THE SAME PARTS THAT GO INTO THE G.H.Q. ASSEMBLED ENGINE

AN ENGINEERING TRIUMPH . . .

Never Before at So Low a Price!!

Indeed an engineering triumph—accomplished by outstanding G.H.Q. designers and engineers, who have constructed into the G.H.Q. motor everything that years of exhaustive scientific aerodynamic research could produce—geared to the highest possible degree of perfection. But more than that, the acid test . . . an overwhelming response. Thousands of users in all parts of the country are praising, recommending, and endorsing this scientific achievement. It seems as if everyone in America wants one. The most hair-raising thrill you've ever experienced will be yours with the G.H.Q. motor—actually one of the most powerful motors ever constructed. Has broken records for amazing performance . . . and just imagine—flies model planes up to 10 foot wingspread. AND JUST AS EFFICIENT FOR BOATS, MIDGET CARS AND STATIONARY USE. Easy to start and simple as ABC to assemble.

ALL PARTS GUARANTEED



Average Assembly Time 30 Minutes

THE ONLY ENGINE WITH A WARRANTY—APPLIES TO BOTH ASSEMBLED ENGINES AND KITS

Over 7000 of these same famous G.H.Q. Gasoline Engines have been sold at \$8.50. Mass production methods and enthusiastic reception have enabled us to reduce the price from \$35 originally TO THE NEW LOW PRICE OF \$4.95.

The new 1940 model now for sale includes the new unbreakable steel stamped piston giving high and perfect compression, drop forged one-piece crankshaft, extra long bronze bearing, etc.

SPECIFICATIONS

4 Port 2 Stroke Cycle. $\frac{3}{4}$ " Stroke. 15/16" Bore. 300-7000 R.P.M. Turns 14" Prop. 8" Pitch. Bearing Surface, 1 1/4" Long. Crankshaft, 5/16" Diam. Weight, 10 oz. (Motor) Rotation, Either Direction. Height, 4 1/2"—Width, 2 1/2". H.P. Approx. 1/5th.

DEALERS!

The G.H.Q. MOTOR KIT

is sweeping the country.
Get your share of this business!!
Our new discount schedule gives larger dealer discounts than ever before!

Write in Today!

WHY PROFIT WITH G.H.Q.?

1. Little investment needed.
2. Attractive discounts.
3. Nation-wide advertising.
4. Free circulars for imprint.
5. Free display cards.
6. Full manufacturers co-operation.

From Among Our Many Dealers' Enthusiastic Letters:
SCRANTON HOBBY CENTER, 525 1/2 Linden Street, Scranton, Pa.:

"I would like to say that I am very much satisfied with the results my customers have had in assembly and running of your motor kits. I have sold to date all but one of the engines which we have purchased from you, and they are all running successfully."

MODEL BUILDERS GUILD, 81 Lawrence Street, Hartford, Conn.:

"Your engine here in the city is popular with the boys and we expect to sell them very fast this summer; that's why we have started to buy them by the dozen."

MODEL AIRCRAFT & CAMERA SUPPLY CO., 422 North Charles Street, Baltimore, Md.:

"We wish to say that your kits and accessories are finding a ready market in this territory. We also find that it is an ideal kit for an amateur builder to experiment so that they may acquaint themselves with the fundamentals of miniature motor construction. The sales are very satisfactory."

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MANUFACTURERS OF

Miniature Gasoline Engines and Model Airplanes

40M EAST 21st STREET,

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5 ft. Flying Scale Models
1 1/3 size of real planes!

Rubber Powered

These are the giant models that have amazed the model builders of America. Imagine strong outdoor flyers that are actually one-third the size of passenger carrying planes—a \$10 value for only \$1.00. Everything is in the kit including all liquids—nothing else to buy!

5 ft. Monocoupe, (shown here) also 5 ft. Heath Parasol and 5 ft. Stinson Reliant available. Specify model wanted.



CONTENTS: Each of these new G.H.Q. Giant 5 ft. Model Planes contains full-size Plans, all ribs, formers and curved parts clearly printed on best grade balsa. Large bottles Cement and Dope, different colors Japanese Tissue. Special Endurance Builders' Ready-Cut 3" Wheels, Wire, Balsa strips cut to size. Washers, and . . . Movable Controls, Shock-proof Landing Gear, Scale Details, Lettering, Numbering and Instructions, Flight Log, etc.

THE G. H. Q. GAS ENGINE CAN BE USED IN BOATS, MIDGET CARS & PLANES WITHOUT ANY CHANGES

The G.H.Q. Gas Engine sold four years ago for \$35. Today, you can secure a vastly improved engine kit for only \$4.95. How is this possible? Simply because we have invested thousands of dollars in tools, jigs, dies and equipment to produce the only mass-production motor in the market. All parts are uniformly perfect.

1939 SALES OF G. H. Q. ENGINES AND KITS TOTALLED 15,000

G. H. Q.'s SIXTH YEAR!

Thousands of Satisfied Users! Read some of these testimonials on file with us:

J. B., Providence, R.I.—"A few weeks ago I received the G.H.Q. motor kit and it is running perfectly. I hope to write you soon and tell you about some excellent flights."

R. H., Prairie du Chien, Wis.—"Your motors sure can take a lot of abuse and knocking around and yet perform perfectly. I have had two in a period of about two years and have seen higher priced motors give less service and performance."

W. W. M., Russellville, Ark.—"I received my G.H.Q. Motor Kit and am very well pleased. I had motor together in 1 hr. 40 min. I will place order next week for G.H.Q. Sportster Kit."

W. L., Claysburg, Penn.—"A wonderful motor that thrills any air-minded person. Strong and neat looking. As good as motors costing twice as much."

A. K., Hillside, N.J.—"I still can't understand how you can put such a dependable and rugged engine on the market at such a low price."

E. T., Sayville, N.Y.—"Received my G.H.Q. Kit okay and am more than delighted with same. You've got 'em all beat for price and performance."

R. P., Hamburg, N.Y.—"I want to extend my personal thanks to G.H.Q. for their prompt service. The motor I ordered was received within 24 hours. Such service cannot be surpassed."

I also want to say that I have the motor running perfectly. I shall do all I can to help promote the success of G.H.Q."

H. H., Midlothian, Ill.—"Motor assembled correctly and performs perfectly. I am fully satisfied."

ZOOM into Aviation



IN THE VERY CENTER AND A VERY IMPORTANT PART OF SOUTHERN CALIFORNIA'S GREAT AIRCRAFT INDUSTRY IS LOCATED CURTISS-WRIGHT TECHNICAL INSTITUTE.

Established in 1929, in twelve years this famous school has come to be recognized as the nation's leading institution in the training of Aeronautical Engineers and Master Mechanics. Mr. Donald Douglas, President of the great Douglas Aircraft Company, chose this school for his own son's training which pointedly indicates the high standing this school has attained in the aircraft industry.

You, who plan to invest in a course of career training to prepare yourself for the future, must determine in advance what the returns will be on your investment before you put cash on the line. This is imperative since your choice of a school in which to take your training will determine how much money you will make all the rest of your life. Your whole future in aviation depends on your training.

Curtiss-Wright Tech's career training is carefully designed to do just one thing—TO MAKE MORE MONEY FOR YOU so upon graduation you can be independent and self-supporting for life. For years our hundreds of successful graduates have proven that Curtiss-Wright Tech training gets results and always pays. It has pro-

vided them with a profitable occupation and secure future since it trained them in advance for the highest position they could ever expect to occupy. It can do the same for you.

Aviation needs trained men. They are in demand and at a premium. Advancements for them are rapid, especially here in Southern California where there are over \$234,000,000.00 in unfilled aircraft orders on hand and where over fifty per cent of all aircraft manufactured in the United States is made. You can get in on the ground floor by training now, BUT you must choose the right school for your training.

Our graduates are obtaining immediate employment and the demand for them far exceeds the supply. We honestly believe that every student who enrolls here will be able to obtain, with our assistance, immediate employment upon graduation. This school has never guaranteed or promised positions for its graduates, but practically every graduate has obtained immediate employment, and all are advancing steadily.

WARNING!—"don't miss the boat." The greatest opportunity of your lifetime exists today! There never was such an opportunity in aviation for you; there may never be another. A position awaits you. Inure for yourself a steady income and independence for life. Send in your enrollment today before you "miss the boat."

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GRAND CENTRAL AIR TERMINAL • 1229 AIRWAY • GLENDALE (LOS ANGELES) CALIFORNIA

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The famous Messerschmitt single seat fighter Bf.109. Speed 340 m.p.h.; 1 cannon and 2 machine guns

SINCE September the great nations have been engaged in the most terrible of man's catastrophes: War. At the front men are fighting and dying and their cities are stricken by the fear of death from the skies. The airplane has no Maginot or Siegfried Lines threatening its passage; the skies have become "the third battlefield," where the Allies and the Reich may fight at will and

Germany's Air Force

only the fitness of the weapon and the man behind it decide the outcome. Should the air strength of either side fail, it would allow the superior force, operating in mass, to cripple the enemy and force the issue of a decisive ground attack.

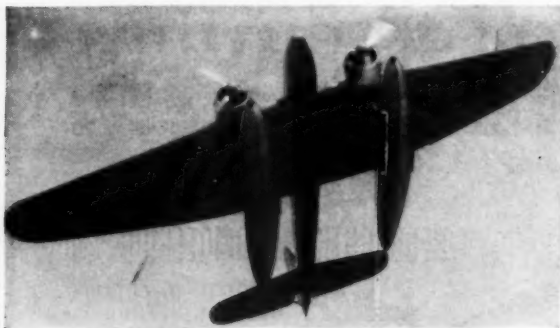
It was this weakness in air power that decided the invasion of Poland in the brief span of four weeks. The Reich's superior air force overwhelmed Polish aviation from the very beginning. Germany threw an estimated 8,000 planes or 75% of the Luftwaffe (Air

Weapon) into Polish skies in its Blitzkrieg conquest, outnumbering the Poles seven or eight to one. When the Polish fliers met a squadron of German raiders, (if they were not engaged by escorting pursuit planes) they were only able to handle a number equal to their own; leaving the remainder to continue on to bomb airfields, roads, railways, cities, or troop-concentration points. Or, on returning from a patrol, they would find their own field a smoking ruin. Consequently, their fuel running low, they were often forced to make hazardous landings with the loss of still more equipment. This and the lack of replacements inevitably caused the end of defensive sky action.

The Luftwaffe always had complete control of skies of Poland, and they were able to continue almost unhindered in methodically crippling the enemy, break up danger points and aid German ground forces to gain their objectives. Another feature was the dropping of saboteurs and spies to relay information to the high command by means of portable radio equipment. They also ferried staff officers



The famous 300 m.p.h. Do.17 light bomber. It mounts only rear guns with restricted arc of fire



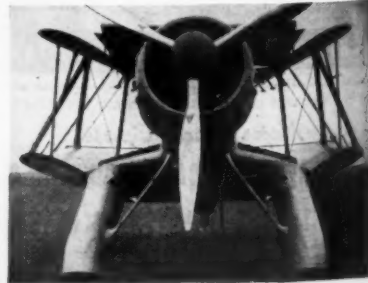
The Heinkel 115 seaplane bomber. (Thorell)



Heinkel He.111 bomber, overhead, with two 910 hp. motors



The Dornier Do.24 patrol boat. It is powered with three B.M.W. Hornet motors of 880 hp. each. It has a high speed of 215 m.p.h. Note the gun turrets in the nose and tail

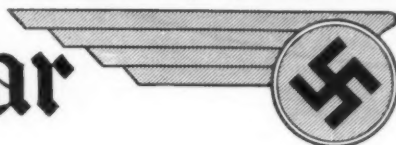


Arado Ar.95 folding wing torpedo, reconnaissance plane for carrier use



The new Henschel Hs.124 bomber with 2 B.M.W. 870 hp. engines. Speed 270 m.p.h. at 10,000 ft. (Thorell)

Wages War



By **ERWIN J. BULBAN**
and
ALICE J. MOLBECK

and delivered important despatches. There is little doubt that without the Luftwaffe, the Polish campaign would have been far more difficult.

For this swiftly destructive aerial warfare the Luftwaffe was using most of its picked equipment and fliers. With the units were crack airmen who had obtained first-hand experience over Spain; veterans who had their "baptism under fire" and had been bolstered with the information the Reich had painstakingly compiled during the conflict. They went about their tasks in a coldly professional manner with confidence in the aircraft they flew.

With the termination of hostilities in Poland, large numbers of planes shuttled back across Germany to face the British and French on the Western Front. It is here that most of the newer production types are getting their first taste of a real war.

The present organization of the Luftwaffe is composed largely of types ranging from the fighter to the medium-heavy bomber. The larger four-engined machines, notably the Junkers Ju.89, are not yet in full scale production, although having passed the experimental stage, several are in service.

The backbone of the fighter squadrons is still the Messerschmitt Bf.

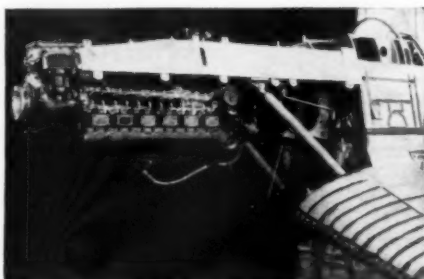
109, of which there are more than 2,500 in use. The Bf.109 is regarded as the most advanced fighter type in Europe because of its fine technical qualities. Of all-metal, low-wing design it has a maximum speed of 340 miles per hour, a landing speed of 58 and a range of 500 miles at cruising speed. The entire trailing edge of the wing may be used as flaps and the leading edge is slotted. The cockpit has a fine array of instruments, including two-way radio and blind-flying equipment. The pilot has excellent visibility because of the position and the large amount of transparency of the pit, which is supplied with

warm air from the engine heat. Various powerplants have been fitted; the Daimler Benz D.B.600 of 950 hp.; the D.B.601 and Junkers Jumo 211 fuel injection model, each giving 1,200 hp. Armament consists of a 23mm. cannon firing through the

(Continued on page 56)



The Henschel Hs.126 observation resembles the U.S. Army Douglas. It's fitted with radio, camera and bomb racks



This shows the details of the engine mounting for the Hamburg Ha.137 fighter



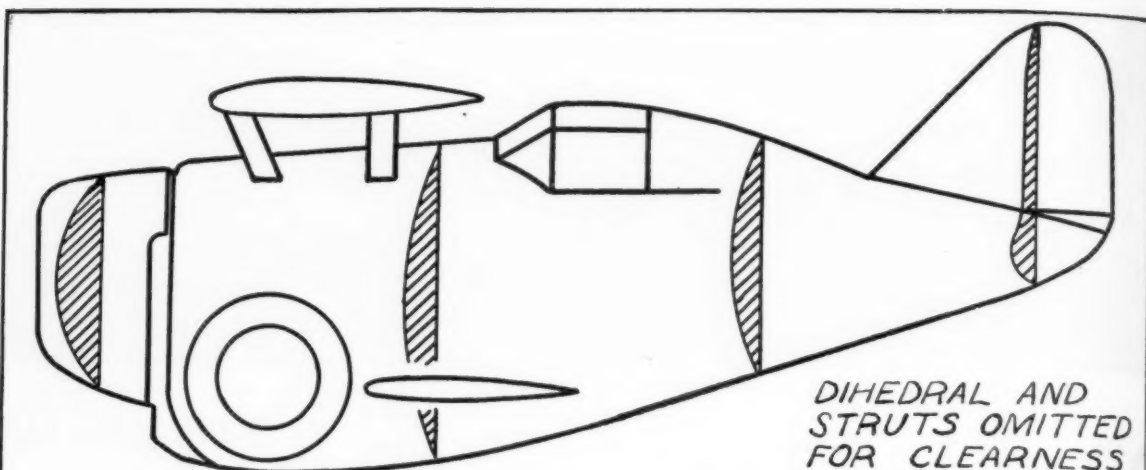
One of the latest deadly Heinkel bombers gassing up for a raid on British North Sea shipping



The Hamburg "140." It carries a 2000 lb. torpedo inside the fuselage as well as bombs. Speed 200 m.p.h.



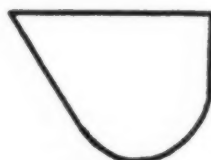
The unique three engine Blohm and Voss patrol boat taking off. Two booms support the tail



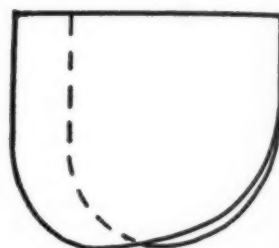
DIHEDRAL AND
STRUTS OMITTED
FOR CLEARNESS



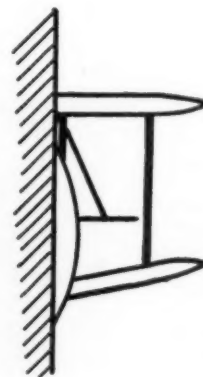
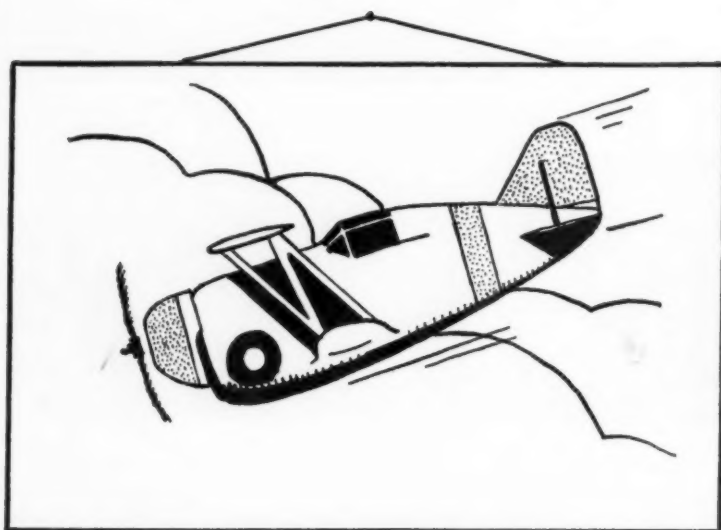
STRUT 1-REQ.



TAIL
TAIL STRUT



TOP & BOTTOM
WINGS



NOT TO SCALE

COLOR SCHEME:

PANEL - SKY BLUE, CLOUDS OPTIONAL

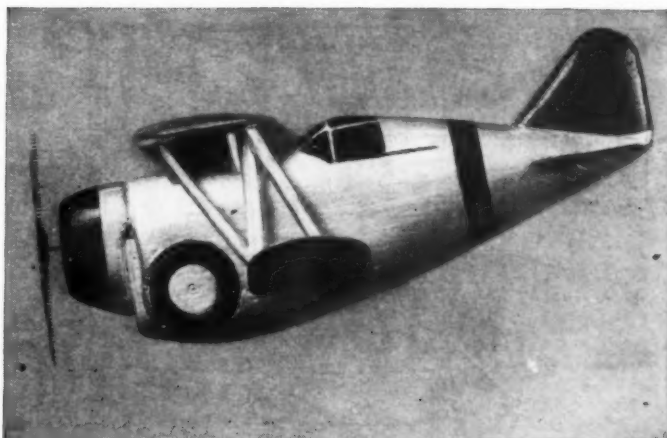
PLANE - SILVER WITH RED TRIMMINGS

GRUMMAN F2F-1

BYRON CALOMIRIS

MODEL Art

How You Can Create Your Own
Dramatic Moments in Aviation,
Pictured in Vivid Realism by
Means of Bas-Relief Models.



The finished bas-relief model ready to insert in your picture of some exciting aviation incident

By **BYRON CALOMIRIS**

A SLIGHT quiver went through the Grumman as the craft, its silvery fuselage flashing in the sun, nosed over. The motor roared in defiance as the test-pilot pushed the throttle forward, and the air rushing by played weird music on the struts. Down came the Grumman faster and faster until to the eye it lost all semblance of its sleek lines and instead became a hurtling blurred mass of metal. The pilot took one look at the wings, said his prayers, and yanked back on the joystick. In a few moments the Grumman, every part groaning under the tremendous pressure, responded to his command and straightened out. Once more the craft presented a beautiful picture against the clouds, and

the pilot with a sigh of relief turned his thoughts to a steaming-hot meal awaiting his return.

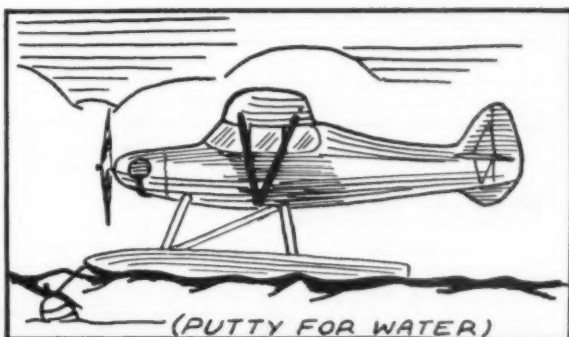
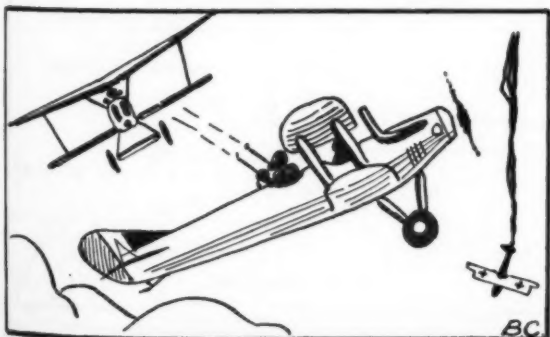
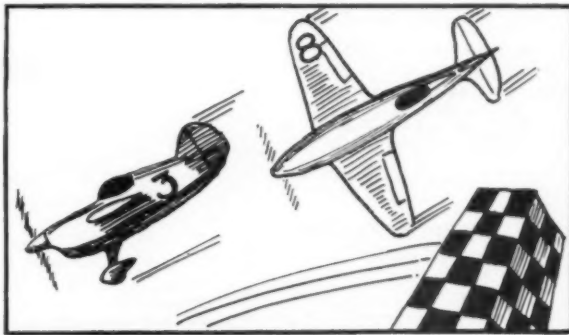
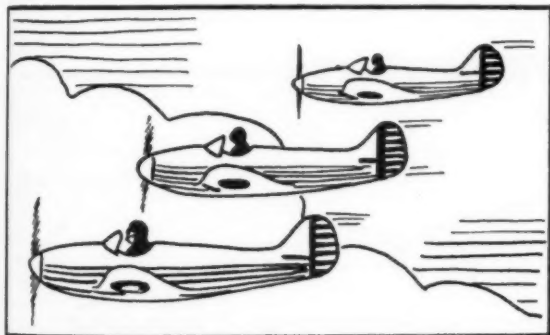
Hitherto only an artist could capture the forceful action of such scenes, but now it is possible for any modeler to do so with a minimum of skill and labor. The pictures you can create are limited only by your imagination. Planes in formation, racers rounding a pylon and dog-fights are a few of the possibilities. "By what kind of magic is all this possible?" you may ask. As usual the answer is right before our noses. The facades of many buildings and the coins in our pockets show many examples of bas-relief.

"Picture models" are an adaptation of

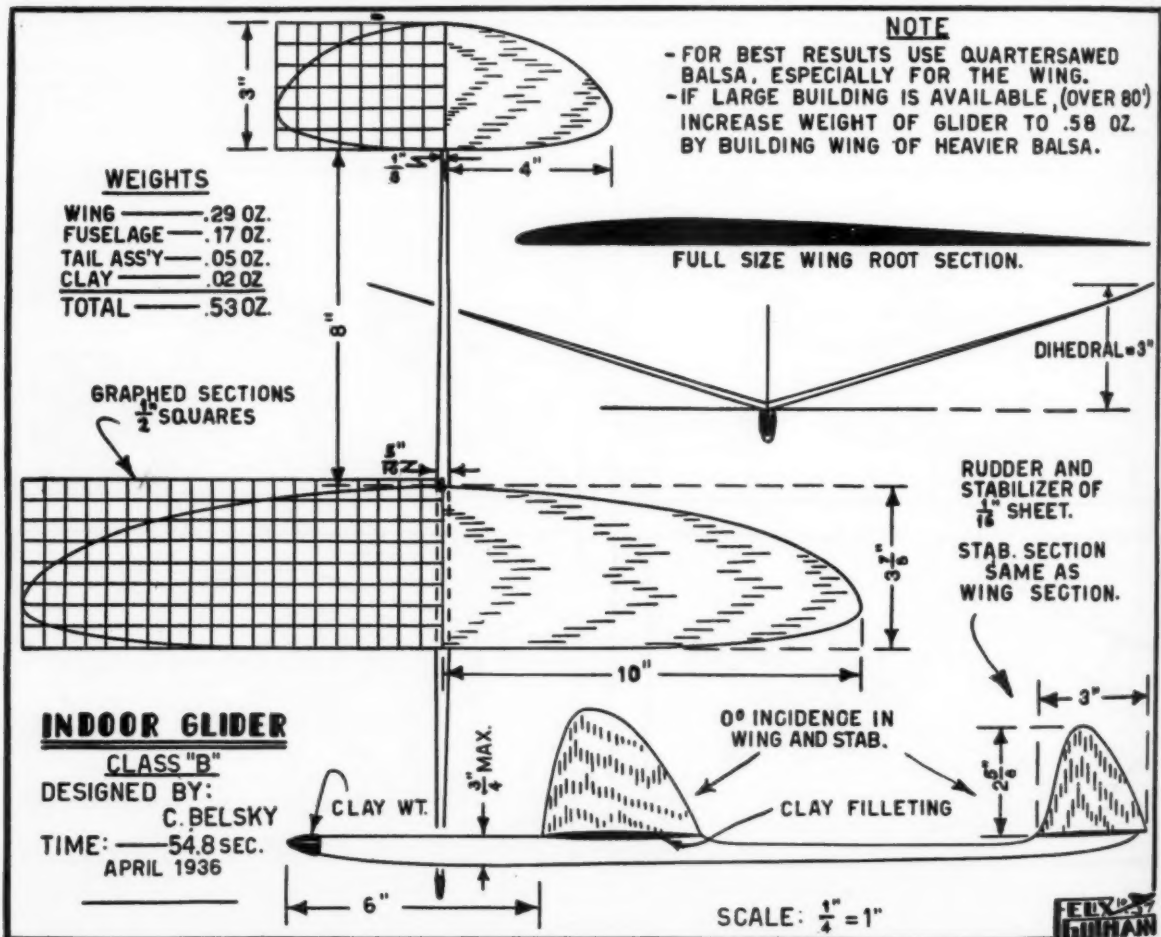
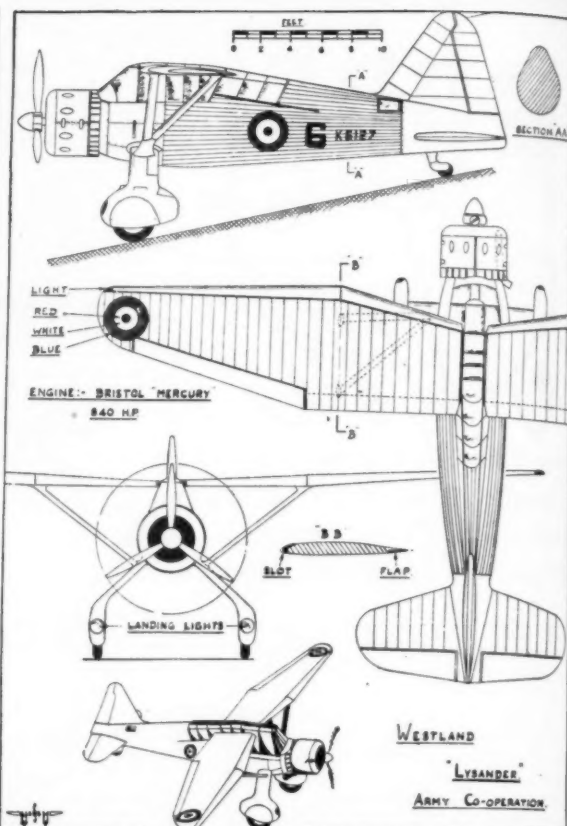
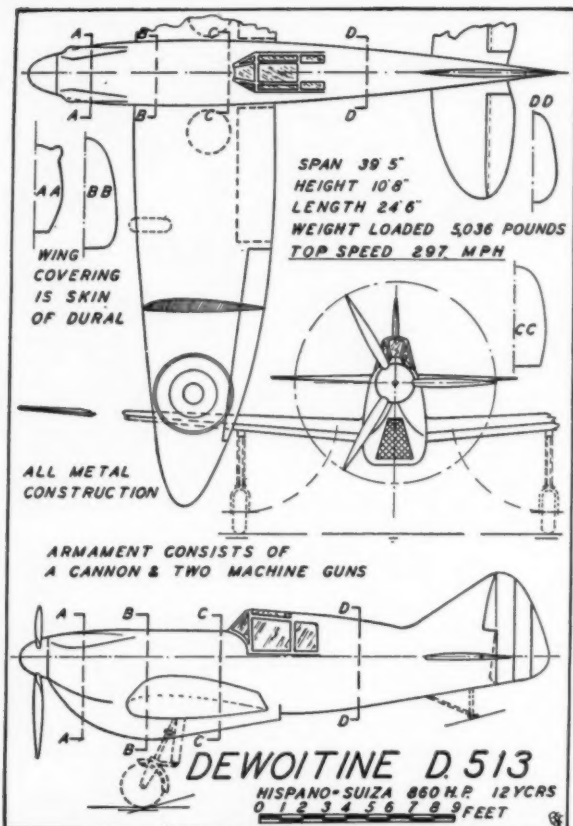
the principle of bas-relief. The model of the airplane is merely an outline of a side, front, or plan view which projects from the panel, thus giving a raised appearance. Take out a nickel and look at the Indian head. The nickel corresponds to the panel, and the raised Indian head corresponds to the airplane.

By this time the various pictures you can create should be well in your mind, and you can see that it is possible to make these models as simple or as complicated as you wish. For example, the panel is more than a starting point. It is the background for your whole scene, and a proper background will intensify the action you

(Continued on page 31)



Here are a few samples of scenes you can make if you do not care to create your own



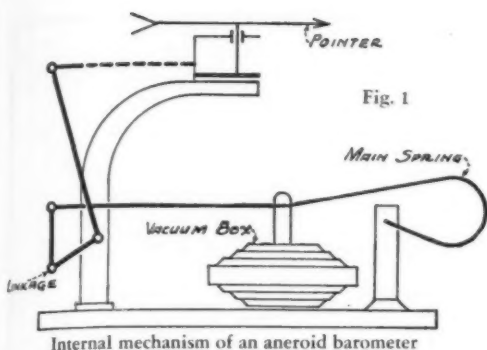


Fig. 1

Internal mechanism of an aneroid barometer

The Physics Of The Airplane

The Properties of Gases

ARTICLE 14

THE most important and intimate of the gases with which we are all familiar with is, of course, air. Atmospheric air consists mainly of two chemical elements, nitrogen and oxygen, with very minute proportions of carbon dioxide and the rarer elements such as helium and argon. The two primary elements while they are not chemically combined, are nevertheless mixed together in the approximate proportion of 79 percent to 21 percent, respectively. The maximum depth or thickness of the atmosphere is approximately 200 miles beyond the surface of the earth: The atmosphere is divided into two portions, the troposphere which is the layer immediately adjoining the earth, and the stratosphere. The height of the troposphere above the surface of the earth is not constant over all locations but tends to show wide variation. At the Poles its elevation is about 5 miles, above the Temperate Zone, $7\frac{1}{2}$ miles and above the Equatorial belt, 10 miles. This region is characterized by a steady decrease in temperature with an increase in the altitude and this "vertical temperature gradient," as it is technically termed, is roughly one degree Fahrenheit for each 300 feet of altitude. At high altitudes the freezing temperatures cause ice hazards. As a direct result of the variation in temperature with an increase in the altitude, the troposphere is subjected to periodic cloudiness and is the abode of weather disturbances and what we term "storms." The troposphere gives rise to the storms because of the close proximity on the earth of large areas of land and water and air circulation commonly called "trade winds," etc., which cause rapid evaporation, condensation, etc., of large masses of circulating air.

The stratosphere, which is divided from the lower layer of the atmosphere by an imaginary line known as the Tropopause, is characterized by a constant temperature which remains about 65 degrees below zero at all times. Consequently neither cloudiness nor storms exist in this region. The winds in the stratosphere, however, blow more steadily and are stronger in intensity than those existing in the troposphere. In order to take advantage of the perpetually good weather conditions existing in the stratosphere, as well as to achieve greater speeds in this area of lessened atmospheric density which reflects drastically lowered resistance to the forward motion or "drag," airline operators are hopefully anticipating scheduled operations in this medium

in the not-too-far distant future. Of course, many varied engineering problems present themselves for solution before this dream can become a reality. Provision must be made for an adequate supply of oxygen for passengers and crew because the oxygen content of the atmosphere decreases with a reduction in the density; the aircraft power plants of sub-stratosphere aircraft must be highly and adequately supercharged in order to permit their normal output to be delivered; adequately heated cabins insulated against the cold; pressure-tight cabins provided with oxygen respiration apparatus; adequate de-icing equipment and provisions made for non-freezing of the movable

described is nearly 28,000 cubic feet whereas the cabin of a conventional sub-stratosphere airliner contains approximately 1200 cubic feet. From a quick perusal of this, we can see that the blowers on the hypothetical airliner must pump or aspirate nearly $1/24$ of the original volume of the tank described or roughly 240 pounds of air. When we consider the enormous volume of 240 pounds of air we can begin to realize what problems lie in store for aeronautical engineers in perfecting flight in the rarified atmosphere. Since this is a direct drain on the engine horsepower, no wonder engines of 1600 to 2000 h.p. will be necessary to fulfill these functions.

**By LT. JAMES P. EAMES
and WILLIS L. NYE**

controls are some of the problems.

Upon casual observation, atmospheric air apparently possesses no weight whatsoever. However, upon investigation we would find that the weight of a mass of air would be of an amazingly high value. For instance, sufficient atmospheric air to completely fill a huge tank or container 50 feet long, 30 feet wide and 18 feet long would constitute a total weight of more than a ton! For scientific purposes, a liter or 1000 cubic centimeters of air, measured under standard conditions, weighs 1.293 grams. From these figures it can be readily ascertained the amount of power required from the superchargers to pump the enormous volumes of air required to maintain somewhat normal density in sub-stratosphere passenger airplanes. The cubical contents of the tank

The science of aerostatics, which governs the performance and operation of lighter-than-air craft, depends upon the buoyancy of the air or the upward force of the air exerted upon bodies which are immersed in it. Thus we see that the principle of Archimedes (Article 13) which has been discussed with relation to liquids, applies as well to gases. The buoyancy or lifting effect of the atmosphere is equal to the weight of the air displaced by a body. Hydrogen gas permits the greatest lifting force to be attained. This fact is proven practically in the case of a free balloon or power driven dirigible. The gross lifting capacity of a balloon, for instance, is equal to the weight of the air which it displaces. The density of the air atmosphere becomes less at higher altitudes, so that the lifting effect decreases as it ascends. For this reason, ballast is carried, either water, sand or lead dust, in the car of the balloon so that it can be discarded when it becomes desirable to make the craft rise higher. Conversely, by allowing some of the gas in the balloon to escape, the craft can be made to descend.

EXAMPLE: A balloon possesses a
(Continued on page 34)

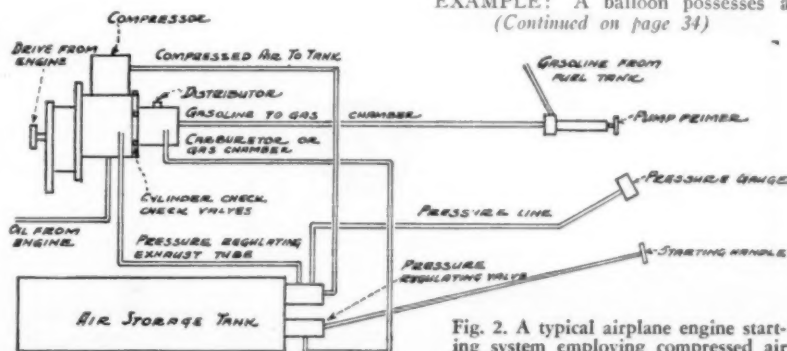
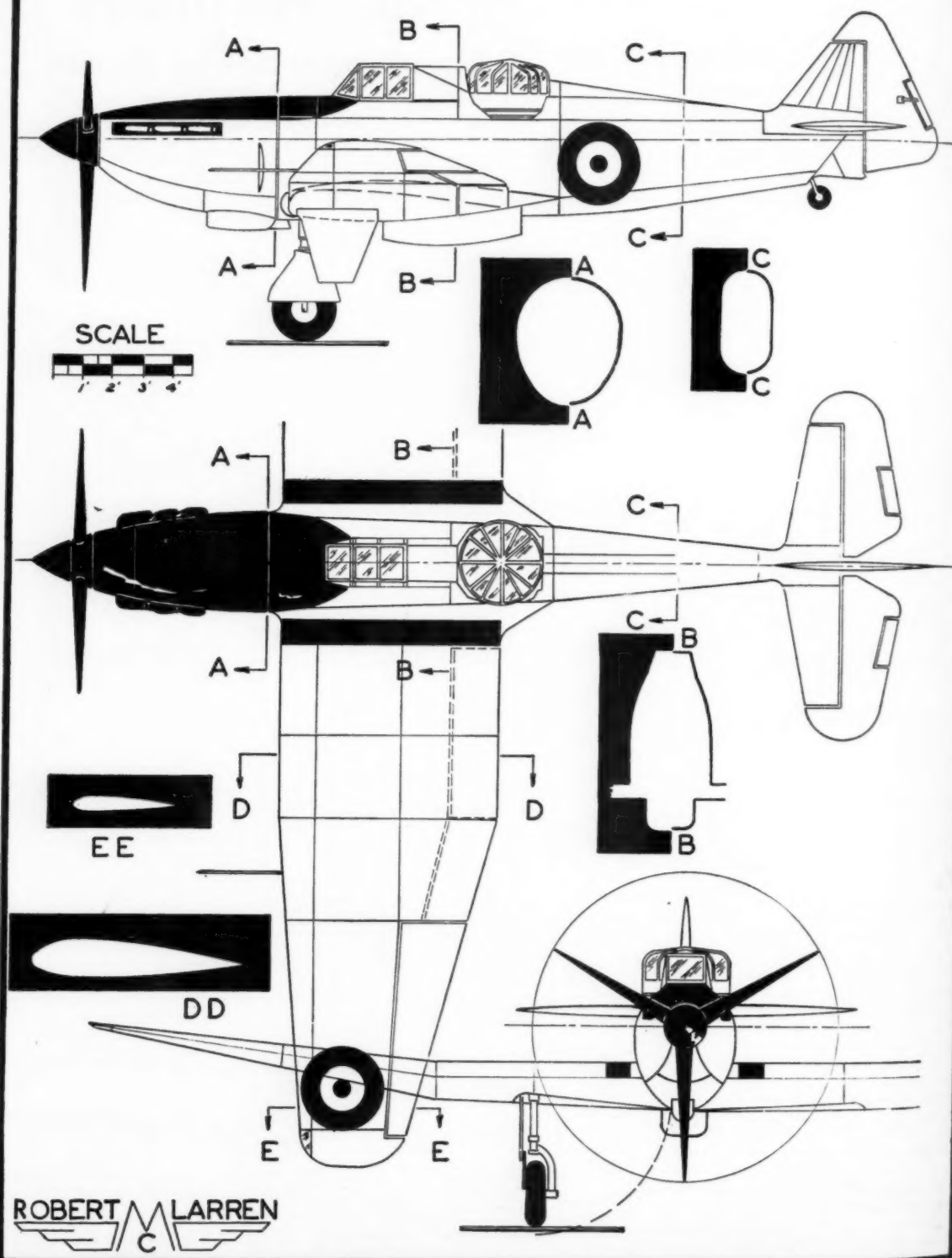


Fig. 2. A typical airplane engine starting system employing compressed air

BOULTON PAUL "DEFIANT"

TWO SEAT FIGHTER OF THE ROYAL AIR FORCE



Hornet Of Defiance

THE PLANE ON THE COVER



The Boulton Paul "Defiant," latest answer to German raids

AND so the war goes on! The apt sobriquet "this cockeyed war," mouthed by Congressman Bruce Barton of New York, has been taken up by the British as the one descriptive slogan of World War II. Still louder is sounding the cry: "Why are they waiting?"

At the front lines they ARE waiting, but behind the trenches at home none of the declared nations are waiting. Germany, France and England have become a scene of incredible speed, hustle and productiveness in the one most efficacious war weapon: the fighting airplane! And now going into startling mass production in the extensive Wolverhampton, England works of the Boulton Paul Aircraft, Ltd., is the latest modern development of the ship the experts have offered as the answer to modern air-war: the heavy-gun two-seat fighter known as the Boulton Paul "Defiant!" our Plane on the Cover this month.

By ROBERT McLARREN

And a part of the structure of that patient waiting is the nervous, almost maniacal preparedness now raging rampant throughout England's Midlands and France's District du Nord. No single airplane can yet be called a child of this war, for no new designs have appeared since that fateful day September Third, 1939. However, most nearly deserving that title is the Boulton Paul "Defiant," for this wicked defender had only just tried its wings when hostility began. It has taken this long to increase production, straighten out supplies of material and coordinate efforts toward putting the Defiant into production.

But now in production she is and on the grand scale that only warfare can command. Soon she will be available in squadron quantities, in the air testing her

mettle. Let's have a preview:

Three salient problems will be solved, it is hoped and believed, by the Defiant: namely, is the two seater fighter a better weapon than the single seat fighter; can a liquid-cooled engine stand up under actual war-time conditions; will the multi-gun power-driven turret prove its worth?

The Defiant has been constructed of aluminum alloy throughout with the exception of the control surfaces, which are fabric covered. Its general design is low-wing, full cantilever wings and tail surfaces, fully retractable and inclosed landing gear and an exposed, hatch type pilot and gunner's compartment.

The fuselage is built up in the conventional manner on a frame-work of aluminum alloy flanged formers and bulkheads with extruded channel type stringers. This structure has been covered with a stressed

(Continued on page 39)

Cloud Chasers!!

By WINTHROP W. ELY

NOT long ago while driving through the rural part of Pennsylvania, we observed three boys in a large pasture flying model airplanes. Being an old time modeler, there was nothing to do but stop and join the boys. They had a rubber powered ship which had been fairly well built and a larger gasoline powered model. The youngest boy, of about 12 years, was twisting the propeller of the rubber model and counting the turns, while his older companions were puttering over the little gas motor.

It is just impossible for an old time modeler to resist getting into the huddle and offering a suggestion or two. "Would not a hand drill with a hook in it instead of a drill bit work a lot better than winding rubber by hand?" The suggestion immediately made three new friends. It was explained that more turns could be put in a stretched rubber and longer flights obtained. It was doubtful if his ship would fly anyway because the wing and tail had warped and there were numerous other things that were not right.

Nevertheless, we complimented the owner on his work and suggested that he come to see our workshop some evening.

These boys, who were obviously farmer lads, are just a sample of what thousands

of boys are like today. They are as anxious to find out what "makes things tick" just as many of us older boys when we found a clock in the attic! They are air-minded just as we were automobile-minded twenty-five years ago.

We could not help contemplating a bit of the days when we first began building model planes. The first one ever attempted was a pine-wood kit with the old type glue that took several hours to set. The ship weighs about two pounds and is still in the attic. The most it would ever do with the rubber wound up was to run along the floor a few feet. That was twenty-six years ago . . . and we are still building model planes.

Another of our early attempts was to learn the art of parachute jumping. A large huckster's umbrella was tugged to the top of the kitchen roof and the jump made to the ground. Future experiments were given up, however, when we were grounded for two weeks with a sprained ankle. But the thrill of being able to fly or make a ship that would sail through the air somehow stays in one's blood. How many can remember the race across the continent by early planes? If we recollect correctly, Ward and Rogers were two entrants and to catch a glimpse of

that frail plane in which Rogers finally won was indeed a thrill.

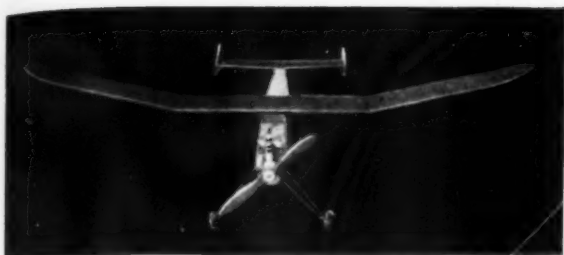
In the modeling of planes and the tuning up of small motors, there is somewhat of the same thrill, and to help youth begin where we older ones must leave off, sort of perpetuates that thrill. We can but dream of the things our boys are going to do.

One thing that is noticeable among model builders is that they are always on the alert for new ideas. Every suggestion in model magazines is digested and stored away in a little pigeon hole of their brains and catalogued "for future reference." Every year new recruits to our model plane clubs are joining by the thousands. If one boy in the neighborhood builds a model, every one of his friends save to buy a kit and try to construct a better flyer, picking up as many ideas as possible from back number model magazines or suggestions from their dads—yes, and how many mothers have helped their sons cover a fuselage with tissue?

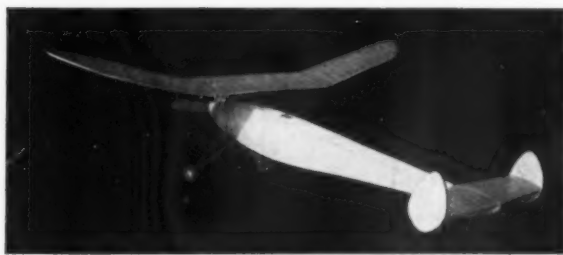
And this brings up to mind one fault of kit manufacturers. Most young modelers, who no doubt are the best customers of such manufacturers, cannot read blue prints and if they make a fair stab at it

(Continued on page 31)

BY FRANK EHLING



Not too much dihedral but stable



A long tail-moment arm gives fine stability

How You Can Build A Class A Gas Model That Is A Consistent Winner—It Climbs Like A Sky-rocket

By FRANK EHLING

THE FINEST qualities a gas model can have are: Simplicity of Construction; Excellent Stability; Steep, High Rate of Climb and Soaring Ability. This little plane has demonstrated that it has all of these qualities to a high degree.

The design is based on two very successful ships: the KG and Maxwell Bassett's "Miss Philadelphia." It is one of the most consistent fliers that has ever taken off a runway and has turned in flights up to fourteen minutes. Due to its long moment arm it is not only stable, but very easy to control; in fact it handles like a rubber powered model. The simplicity of its construction not only makes it easy to build, but is an assurance of a minimum of weight.

The wing area is 225 square inches; which is equivalent to 1.56 square feet. Under contest rules this ship must weigh 8 ounces for every square foot of wing area. Therefore this plane cannot weigh less than 12.5 ounces. The original ship was built as light as 12 ounces.

One of the most important factors in contest flying, under the 1940 rules, is the cubic inch piston displacement of the engine. Naturally the builder of any plane will be highly interested in knowing what engine he may use to power his ship; it is advantageous to put as much power in his plane as allowable. According to the new specifications a plane must weigh at least 80 ounces for every cubic inch of piston displacement.

Therefore this little plane cannot be powered with an engine with a cubic inch piston displacement of more than 1.156, if it weighs 12.5 ounces. At this weight the following engines may be used:

Elf, Gnat, PeeWee, Syncro B, Brat and Atom.

With the addition of a little more weight, a number of additional engines may be used. For instance, a Bantam, which has a c.i.p.d. of .165, may be used provided the plane weighs 13.2 ounces. A Kadet motor, having .163 c.i.p.d., may be used if the plane weighs 13.5 ounces. For further information concerning en-

gines that may be used in this model, you may refer to the engine chart on page 15 of the March issue of MODEL AIRPLANE NEWS.

Before construction is started it is suggested that you draw full-size plans by scaling up the plans given here four times. Build one side on top of the other to obtain accuracy. When dry remove from the drawing in one piece. Cut the two sides apart and put the necessary cross pieces carefully in their places, top and bottom.

cement and bound to the longerons with thread.

The wing mount is bent to the shape and fastened to the body in the same manner as the landing gear. Dowels are bound across the tops of the finished mount.

At this point the battery box can be installed along with the coil and condenser. After the timer is installed the fuselage can be covered with a good grade of tissue.

For the wing, cut the required number of ribs from one-sixteenth sheet C stock. The wing is built in three sections and joined with one-thirty-second three-ply wood gussets and dowels. This forms the correct dihedral angle. Make sure that no warps are formed in the wing panels as they are drying. Bamboo wing tips are added and the whole structure is sanded smooth, ready to be tissue covered.

The stabilizer is built as shown on the plans with square tips to accommodate the twin rudders. The twin rudders are cut from sheet and sanded to a streamline section. These are cemented to the tips of the covered stabilizer.

Finish the complete covering job by spraying the tissue-covered surface with water. When dry, clear dope is applied.

Flying

Fasten on all surfaces with rubber and glide the model. If it appears a trifle nose-heavy, give the main wing a little positive incidence. If the ship stalls, add a little positive to the stabilizer. Fly with a little power at first, for mistakes can be safely adjusted before full power is applied. Under power the model should turn with torque and glide against it for best results.

When launching the model release it and let it take off under its own power. Do not push it as this often results in crashes. Every model should seek its own flying speed when taking off.

A Midget GAS WINNER



The author with the little plane after a contest which it won

Note that the bottom longerons do not have to be separated where the triangular cross-section begins. The motor bearers are cemented in place directly to the inside of the body. When this fuselage construction is completed it is ready to be sanded, to insure a smooth covering surface.

The landing gear is bent from one-sixteenth wire. Bind the ends with 0.40 copper wire and solder. When finished it can be fastened to the fuselage with

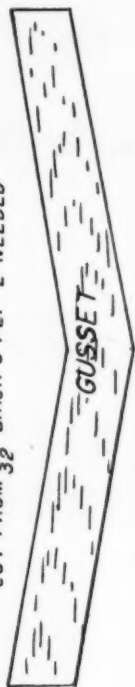
PLATE 8

ALL RIBS $\frac{1}{16}$ " SHEET "C" STOCK



WING RIB TEMPLATES

36-OF-A
2-OF-B
2-OF-C
2-OF-D

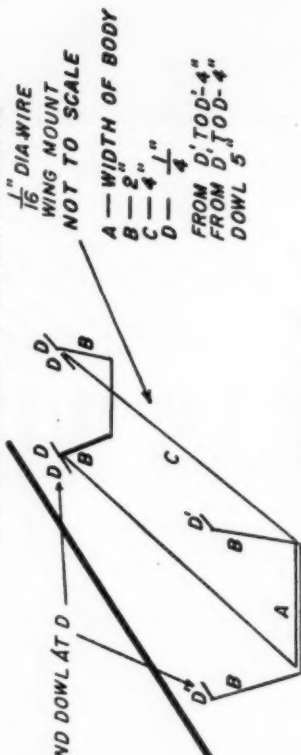


CUT FROM $\frac{1}{32}$ " BIRCH 3 PLY 2 NEEDED



STABILIZER RIB TEMPLATES 2 OF EACH ABOVE

CEMENT TO SPAR TO RETAIN DIHEDRAL

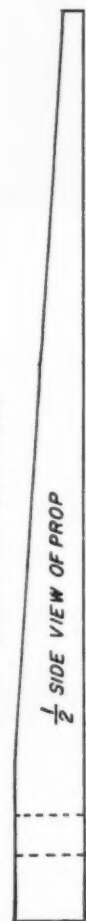


BIND DOWL AT D

$\frac{1}{16}$ " DIA WIRE
WING MOUNT
NOT TO SCALE
A — WIDTH OF BODY
B — 2"
C — 4"
D — $\frac{1}{4}$ "
FROM D' TO D — 4"
FROM D TO D — 4"
DOWL 5

BEST RESULTS AT 3500 R.P.M.

$\frac{1}{2}$ SIDE VIEW OF PROP



DRILL HOLE TO FIT SHAFT

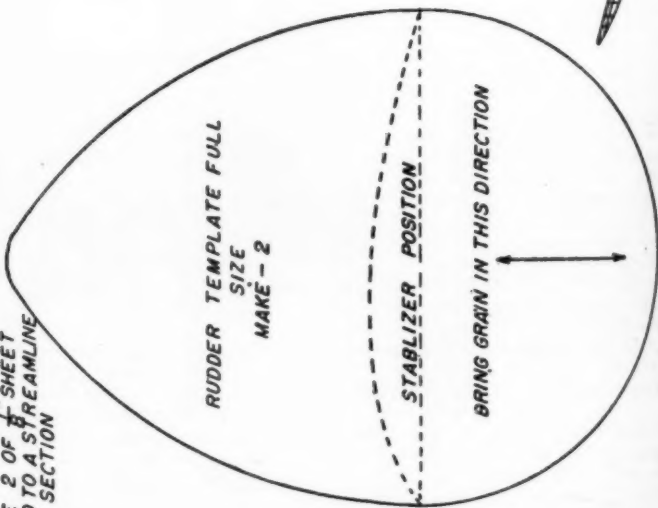


BASS OR WHITE-WOOD
GIVE AT LEAST 5 COATS OF DOPE

FULL SCALE-EXCEPT WHEN
NOTED

MAKE 2 OF $\frac{1}{16}$ " SHEET
SAND TO A STREAMLINE
SECTION

RUDDER TEMPLATE FULL
SIZE
MAKE - 2



STABILIZER POSITION

BRING GRAIN IN THIS DIRECTION

NOT TO SCALE



4" BY FRANK EHLING

PLATE 2



The new Amiot medium bomber; one of France's most modern craft, capable of high speed

FRONTIERS

By ROBERT C. MORRISON

PROBABLY you have heard the murmurings of a new Douglas six-engined bomber a-building in that company's giant assembly hangar. "Newsweek" states that it has been redesigned for four more powerful engines, has a 210 foot wingspread and carries close to 20 tons of bombs, ammunition and armament. Its first test flight will be staged very soon. Having a cruising range of 6,000 miles, this huge bomber, designated the B-19, will make short work of crossing the Atlantic and could create quite a disturbance over Ger-

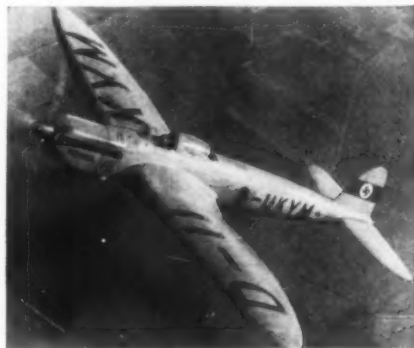
many if such is her future. The prototype will be the army air corps' own "Leviathan," but the type will be available for export.

Just two years ago, it will be remembered, Douglas had a monopoly on the domestic bomber business. Now many companies have completely smashed that monopoly, but still Douglas is the big bomber-builder. Orders are on the books for French DB-7 light-bombers, A-20

attack-bombers, B-23 medium-bombers, the B-19, and now Canada has ordered 20 Model DB-280 medium-bombers similar to the B-18A . . . but here is the big news: Not letting Consolidated and Boeing outdo her, Douglas is the proud possessor of still another new order of \$4,000,000 for five four-engined battle cruisers, faster and smaller though similar to the B-19! Weighing 70,000 pounds empty to the B-19's 150,000



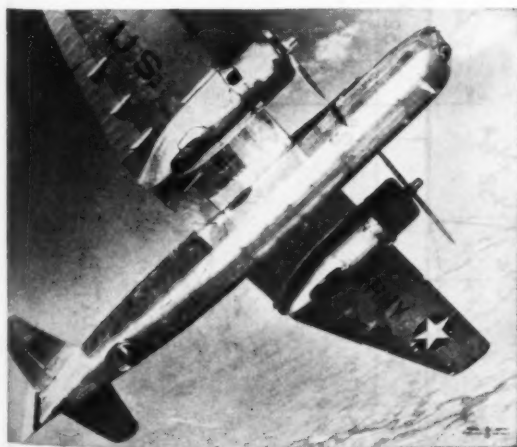
The new Republic 330 m.p.h. pursuit plane built for the Swedish government, powered with a 1,050 hp. motor. (Acme)



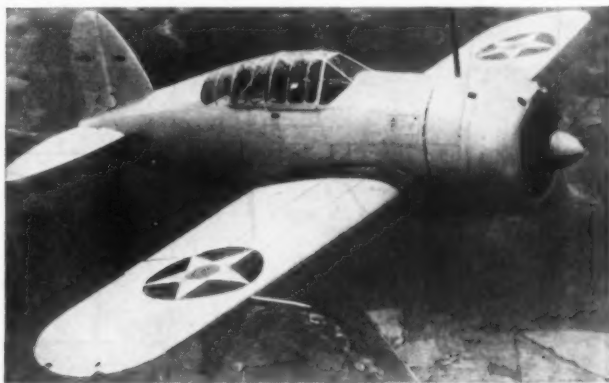
The Heinkel 118 long range two seater bomber powered with a diesel engine. Other information lacking



A Curtiss Hawk 75A flying over the front lines in France. Note the guns in the wings and nose (Intern'l)



The new Stearman high speed attack bomber, the XA-21, with two 1400 engines. Note the belly gun turret (Globe)



40 of these Brewster single place fighters have been shipped to Finland to battle the Russians. They are fast and maneuverable. (Acme)

fully loaded, these high-speed ships for the U. S. Army Air Corps will carry fuel in their wings sufficient to feed four 2,000 hp. Wright Double-row Cyclones for 5,600 miles non-stop. Yes, and no other plane company can make that statement. If you

(Continued on page 48)

By
CHARLES HAMPSON GRANT

TO THE novice model builder, an airplane propeller is a most mysterious spinning instrument that is located usually at the nose of the plane. Apparently it acts as a fan, beating the air backward and thereby from this reaction, pulls the airplane forward. With the development of greater understanding of the propeller's operation this conception is usually replaced by the realization that a propeller is very much like a screw. As it turns it screws itself forward through the air. The less air disturbance that is created by the rotation of the propeller, the more efficient is its action. The whole purpose of a fan is to disturb or churn the air while remaining motionless in respect to forward motion. On the other hand, in the case of a propeller, as much as possible of the applied power should be transformed into forward motion with little air disturbance. It should in reality cut a spiral path through the air.

A propeller is nothing more than a number of wings attached to a central hub. As the whole combination rotates about an axis at the center of the hub, the wings or blades, as they are called when referring to a propeller, pass through the air and generate lift in the same manner as ordinary airplane wings. Of course as the blades swing around in a vertical plane they "lift" forward, not upward. In such a case the "lift" is termed "thrust" because it acts in a horizontal direction instead of vertically. Fig. No. 20 shows a typical propeller, while Fig. No. 21 shows the spiral path of one of its blades as the propeller revolves and screws itself forward; operating against the air's reaction on the propeller's blade surfaces.

In effect the path described by a propeller in its operation is a helix. Thus in order that all parts of the propeller blades shall pass along this path at proper angles, the propeller itself must be of necessity a section of a helix. The name: "helical

FUNDAMENTALS OF MODEL PLANE DESIGN

Designing The Propeller For Your First Model Plane

propeller" is derived from this fact.

In order that the blades have the form of a helix, the angle of each blade chord element, from hub to tip, must change progressively. At the hub the blade is parallel to the axis of rotation (the shaft) while the blade at the tip is at a considerable angle (LAN) to AL', which is parallel to the axis; Fig. No. 20. At a point half-way from the axis to the blade tip, the angle of

the blade L'A'N' is just half as great as at the tip, measured from A'L' parallel to the axis. In Fig. No. 20, XY is the axis of the propeller. Line A'N' is parallel with the surface of one of the blades at the half point and AN is a line parallel with the blade surface at the tip. The angles of the blade at other points along its length is proportional to the distance of the points from the axis. Therefore, actually a propeller blade is a "twisted" surface.

Five Factors of Propeller Design

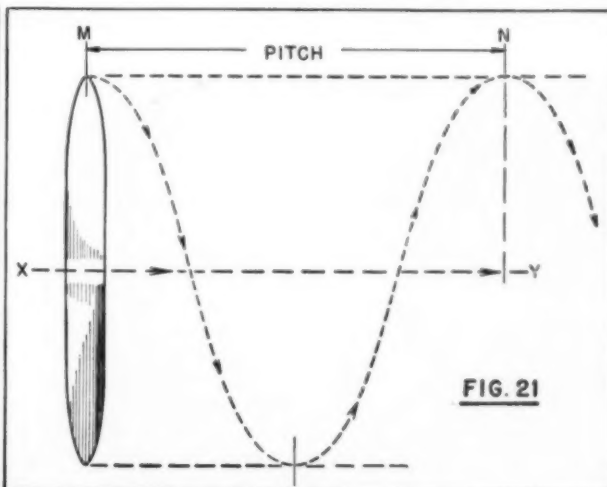
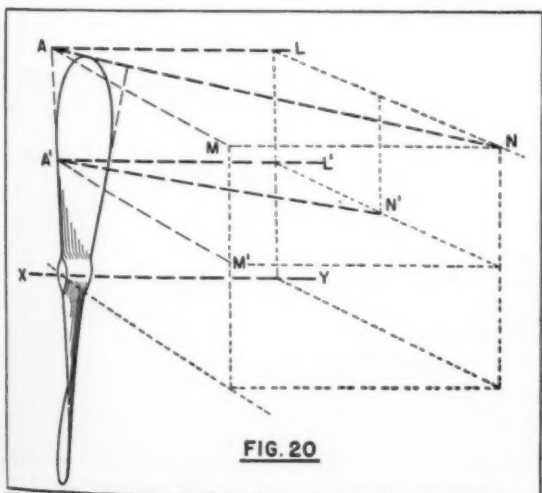
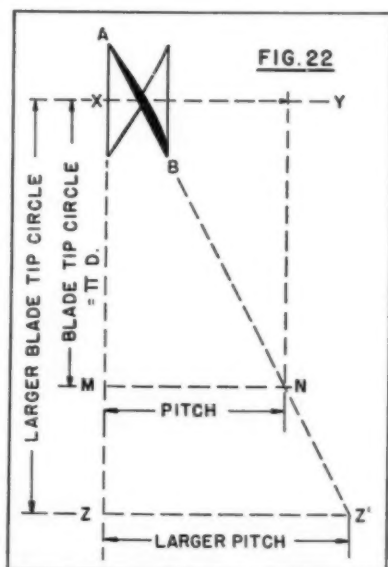
The five vital characteristics of any propeller which affect its operation are: diameter, pitch, blade area, blade cross section and the contour or outline shape of the blades.

The propeller diameter is the greatest distance across the circle described by the tips of the blades as they rotate without forward motion. If the propeller has two blades, the diameter is the distance from the tip of one to the tip of the other; some call it the length of the propeller; Fig. No. 20.

The pitch is the theoretical distance that the propeller will screw itself forward in one revolution. It is the distance MN in Fig. No. 21. The magnitude of the pitch depends on two factors, the diameter of the propeller and the angle of the blade at any point along its length, relative to the plane of rotation; (An imaginary surface perpendicular to the propeller axis.)

The angular value of a propeller blade is called the blade angle and it is customary

(Continued on page 70)

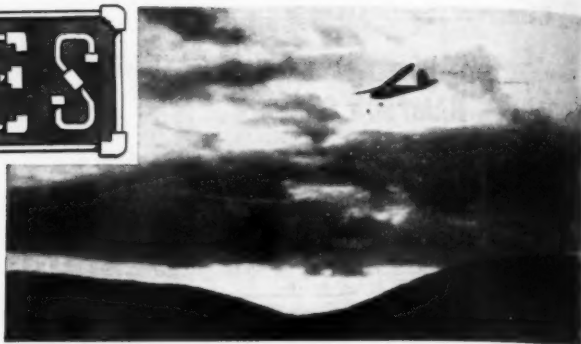


GAS LINES

Gas Model News From All Parts of the World

IN THE March issue there appeared, on page 14, the MODEL AIRPLANE NEWS—Model Aircraft Engine Directory for 1940. A number of our readers have misunderstood that the engines listed here were the total number for which data would be published during the coming year. The directory shown was only the first install-

Pict. No. 1. A sunset flight by Ernest Shott's gas model near Lebanon, Pa.



Pict. No. 2. Angel Pacifico of Cuba

ment of engines and their characteristics; the installment covering engines which were in existence up to the middle of September, 1939.

In our next issue will appear a further list of characteristics of engines which have become available since September. After that, from time to time, the characteristics of new engines will be given in succeeding issues of this magazine.

We especially request that anyone who has a new engine, send in all available data immediately so that it may be listed for the convenience of our readers. The data given on the chart was compiled from information received from the manufacturers.

We understand that there are one or two items which at present are not accurate. We will be glad to make corrections of these if new, correct data is sent to us. Several corrections can be made at the present time:

On the chart, under the "Block Test" column, the Brown D. Belmont, Bunch Midget and Gwinn Aero are listed as not being block tested. This is an error as all of these engines are given a thorough test before they leave the factory. In the cases mentioned the chart mistakenly referred to kits. So change your chart to read "Yes" for each of these particular places marked "No."

The Kadet engine has a piston displacement of .163. The minimum allowable weight of the plane in which this engine may be mounted should read 13.05 ounces.

The Hi-Speed Torpedo is in class B and has a piston displ. of .299 and not .304 as on the chart. The minimum plane weight is 23.92 oz.

From Ernest E. Shott of 1223 Church Street, Lebanon, Pa., we received picture No. 1, which shows his first gas job coming in after a long flight. He has made 262 flights with this ship, with only ten unsuccessful ones. It weighs 5 pounds and is powered with a Syncro Ace Special. Mr. Harry E. Moyer, an old model designer, assisted in its construction. Last year the season for the boys in Lebanon started with a total of five and ended with sixteen models in the group.

Picture No. 2 comes all the way from Cuba, and shows Mr. Angel Soto Pacifico of Aguilera 616, Santiago de Cuba, with his latest gas model, the "Professor Junior," equipped with a Phantom motor. Mr. Pacifico says that it has given fine performance. The flying field is in San Juan Valley, adjacent to San Juan Hill, famous in the Spanish-American War. In Santiago model building and flying is a favorite activity and the builders are plan-



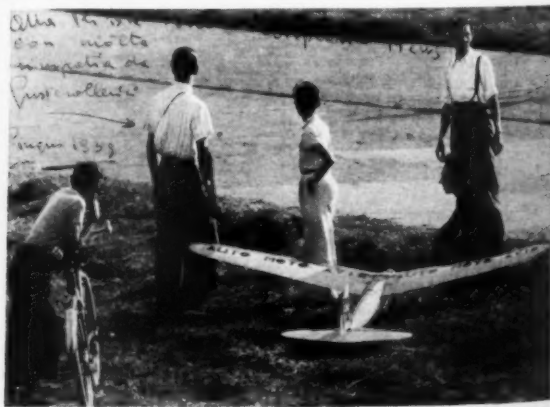
Pict. No. 3. Elmer Powell and his winner



Pict. No. 4. Hibbert's Porterfield



Pict. No. 5. Airways mechanics operate on a gas job



Pict. No. 6. Italian boys are "gas" conscious too



Pict. No. 8. A perfect scale model of a North American observation plane built in detail to factory specifications by R. Stout



Pict. No. 7. An easily built job with fuselage covered with balsa sheet; by Blake Arnold, Jr.

ning to attend the Cuban Model Airplane Championships which are expected to be held at Havana sometime in March.

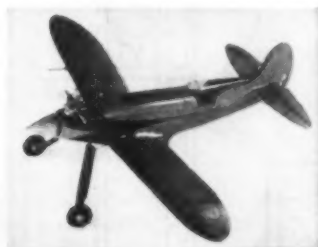
Mr. Pacifico belongs to and is a director of the Concentracion Cubano De Divulgacion Aeronautica, a club composed chiefly of students, lawyers, doctors, surveyors and aeronautical students.

In picture No. 3 Elmer Powell of 259 Jackson Avenue, Jersey City, N.J., is shown holding his 54 inch span gas job and the cup which it won by taking first place at a recent contest held by the Jersey Airsquires. The average time for three flights was 3 minutes 45 seconds on a ten-second motor run. In the marathon event the same plane took second place. It appears that Powell has a very consistent flying job. He says:

"The plane has 375 square inches of area. The Grant X-8 wing section is used. Three wings were tried, each with a different airfoil, but the Grant gave the best flights. The weight of 21 ounces brings the wing loading to 8 ounces per square foot."

In a past issue we showed a picture of a scale model Porterfield which could be used as a gas or rubber powered craft. We were unable to give the name of the builder at that time but since then we have found him. He is William Hibbert of 4717 Large Street, Philadelphia, Pa., and is shown in picture No. 4 with his plane. It is an exact flying scale model of a Porterfield Zephyr and was built to a scale of 1-1/2" to the foot. The wing span is approximately 52 inches. The wing contains the exact number of ribs of the large ship and the entire model is covered with silk, painted white with red trimmings. It is powered with an Ohlsson "23" engine,

Picts. No. 9 & 10. Victor Stanzel flying his model "a la" fish line & pole. Right: Stanzel's beautiful streamline model that flies 60 m.p.h.



Picts. No. 11 & 12. Left: James Clark's skywriting model. Right: The little plane in action looks like the real thing



which is enclosed very cleverly within the cowl. The cylinders shown on the side of the nose are dummies which represent the cylinders of the large ship.

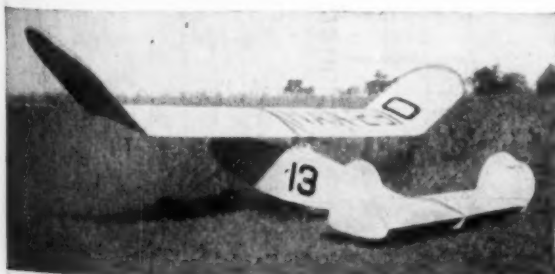
Mechanics of the Braniff Airline have become model-wise; at odd moments supplementing their aeronautical training by building and flying gas models. Picture No. 5 shows a group of them trying to adapt the tools for large planes to gas models. This particular plane was built by a member of the Dallas Gas Model Association, Frank McClendon. The propeller is being changed by means of a spanner wrench used for the large ships. Our curiosity gets the better of us, and we wonder what the spanner wrench held by the mechanic in the rear of the picture is going to be used for.

In Italy, as well as in America, young men are grounding themselves in the fundamentals of aviation through gas model



Pict. No. 13. Bill Johnson's modified Beechcraft gas job with negatively staggered wings.

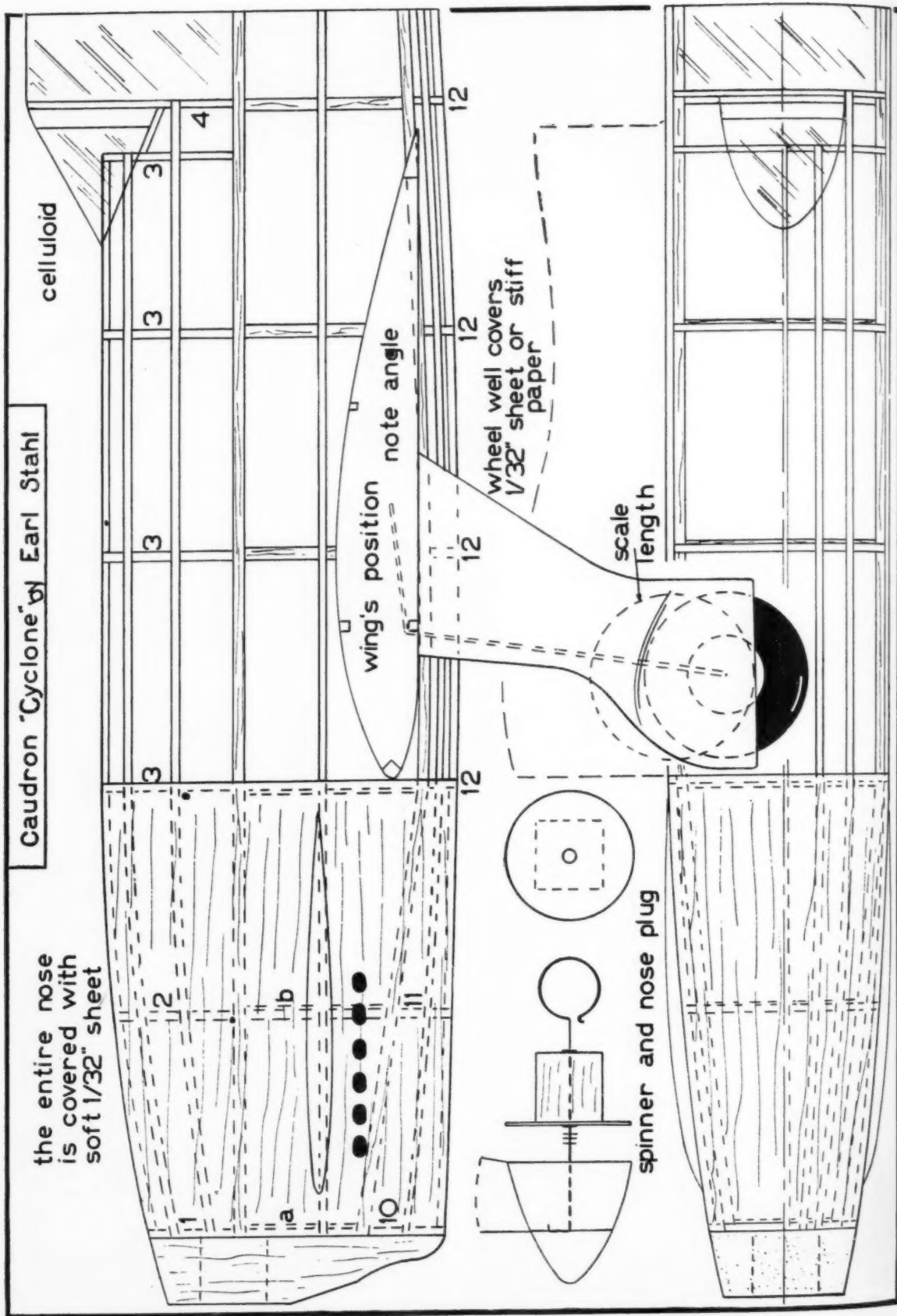
flying. Picture No. 6 was sent to us by Gustavo Clerici e Gildo Treti. If you can read Italian you will be able to decipher the remarks which he has written on the picture. The arrow points to Mr. Treti. (Continued on page 59)

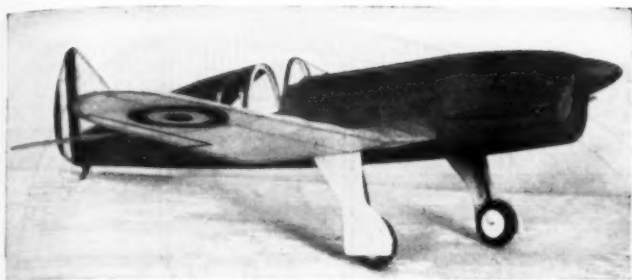


Pict. No. 14. Jim Cody's "box-car" that beats streamliners



Pict. No. 15. The Chicago Aeronauts hold a contest





The finished low-wing model; just like the "big" ship

Build and Fly THE CAUDRON War Plane

By EARL STAHL

**An Exact Scale Model of One of France's
Latest Fighters That Combines Realistic Appearance With Fine Performance**

WAR has again come to Europe and, as in the last great conflict, the airplane is destined to play a major hand in this ghastly game of destruction. Production of all types of planes has been speeded to a dizzy pace and unknown numbers of new designs are being developed for the sole purpose of destroying lives and property.

In France the Caudron firm has just recently produced a new lightweight pursuit plane which is most remarkable. Applying the knowledge gleaned from its numerous racing planes, the most famous of which is the winner of the 1936 Thompson Trophy race, a high performance, low cost fighter has been developed. The model C-371, known as the "Cyclone," is an all-wood low-wing monoplane powered with an inverted twelve cylinder Renault engine which develops 450 horsepower. And it seems that the Caudron engineers have not forgot the formula for getting high speed with low power, since the maximum speed with full load is over 300 miles per hour. Most unusual is the fact that the wing's 29-foot span is only one foot more than the overall length. That this plane will see much service at the "front" seems assured since reports indicate that it is comparatively easy to fly—just the thing for pilots hastily trained in war-time schools.

Our model is a faithful reproduction of the real plane—and it seems to inherit some of its speed, too. Because of its attractive appearance and flight ability, it will be a worthy addition to your fleet. However, a word of caution before beginning the construction: For maximum flight performance it is necessary to make the model as light as possible while still retaining the required strength, so select all materials carefully. Firmly fix the method of construction in mind before starting to work and, finally, make the structure as accurate as possible.

Wing

Start the construction by cutting the wing ribs from sheet balsa. Two ribs of each type are needed with the exception of R-I of which eight are required. Two of the R-I ribs are cut from 1/16" sheet, and all others are cut from 1/32" sheet balsa. Sandpaper all the ribs smooth and cut the notches for the spars. The wing is built in three individual pieces: the center section and the right and left panels. Make a complete center section plan and build directly atop it, using very hard spars in this unit since they must carry the shock of landings. Taper the outer trailing edges as noted on the plan. Spars of the outer wings are medium-grade wood. Trace the wing tip pieces on 3/32" sheet and cut out. Complete the wing by trimming the tips and leading edges, finally sandpapering lightly.

Fuselage

A rectangular frame forms the base of the fuselage structure. 3/32" square medium-grade strips are used to make this frame, which is shown lightly shaded on the plan. Build the two sides first, one over the other so they will be identical, and then join them together with 3/32" square cross pieces as shown by the top view.

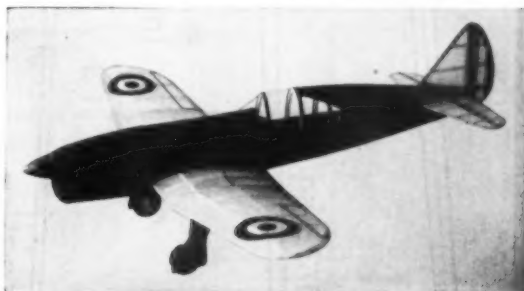
The fuselage formers are cut from 1/16" thick sheet, and in the interest of greater strength it would be best if they were cut from a sheet of laminated balsa with the grain crossed. Accurately mark the position of the notches but don't cut them out until it is certain that the stringers won't be pulled from their natural positions. Cement the formers in place and add the

1/16" square stringers. The one stringer running back on each side is cemented directly to the underframe. Since the top cross-pieces of the basic frame will interfere with the rubber motor, it will be necessary to remove them at this time. Use a razor-blade and cut each cross-piece off flush with the inner edge of each former.

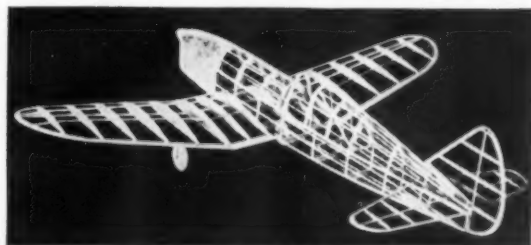
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The model in full flight



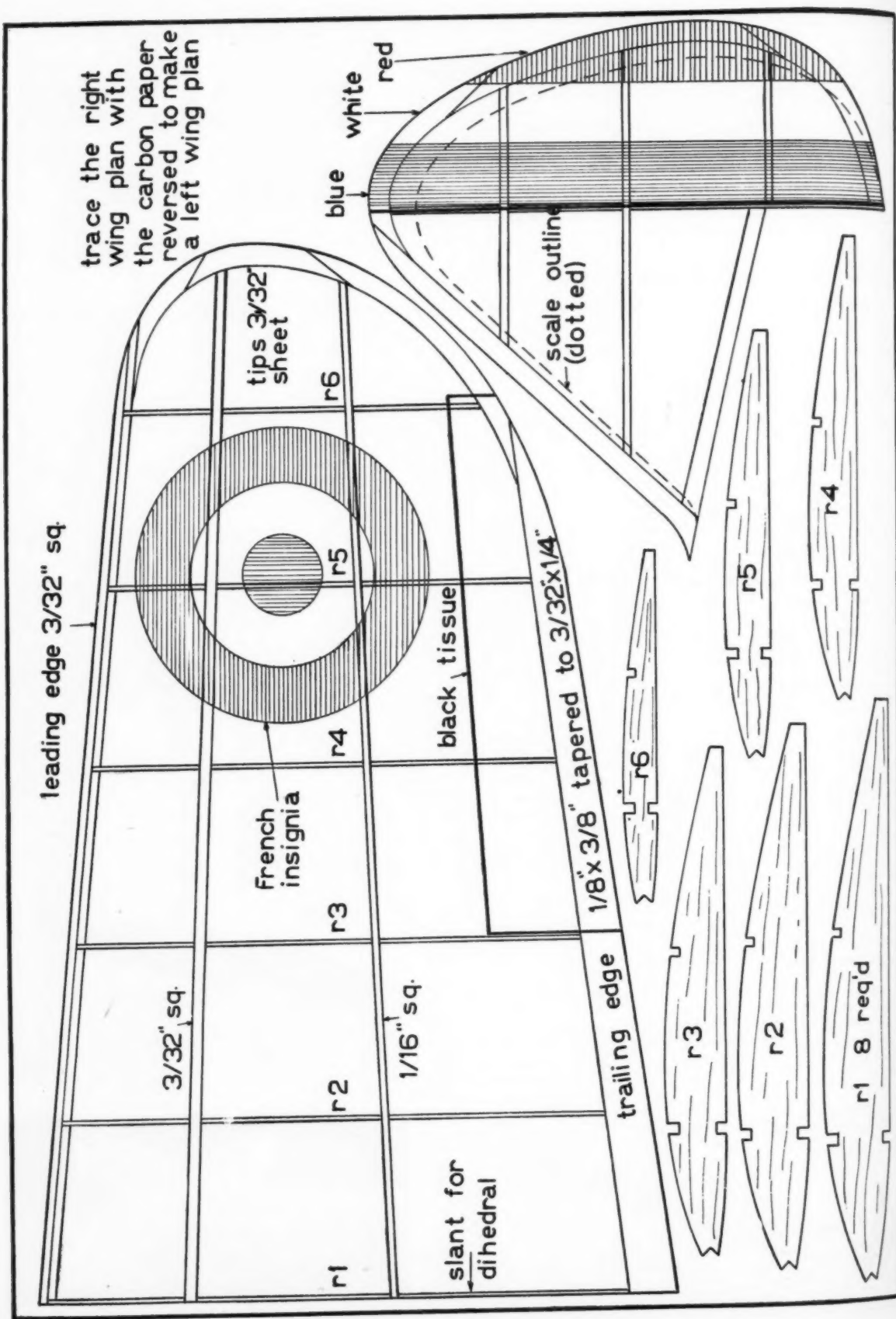
Details give it fine appearance

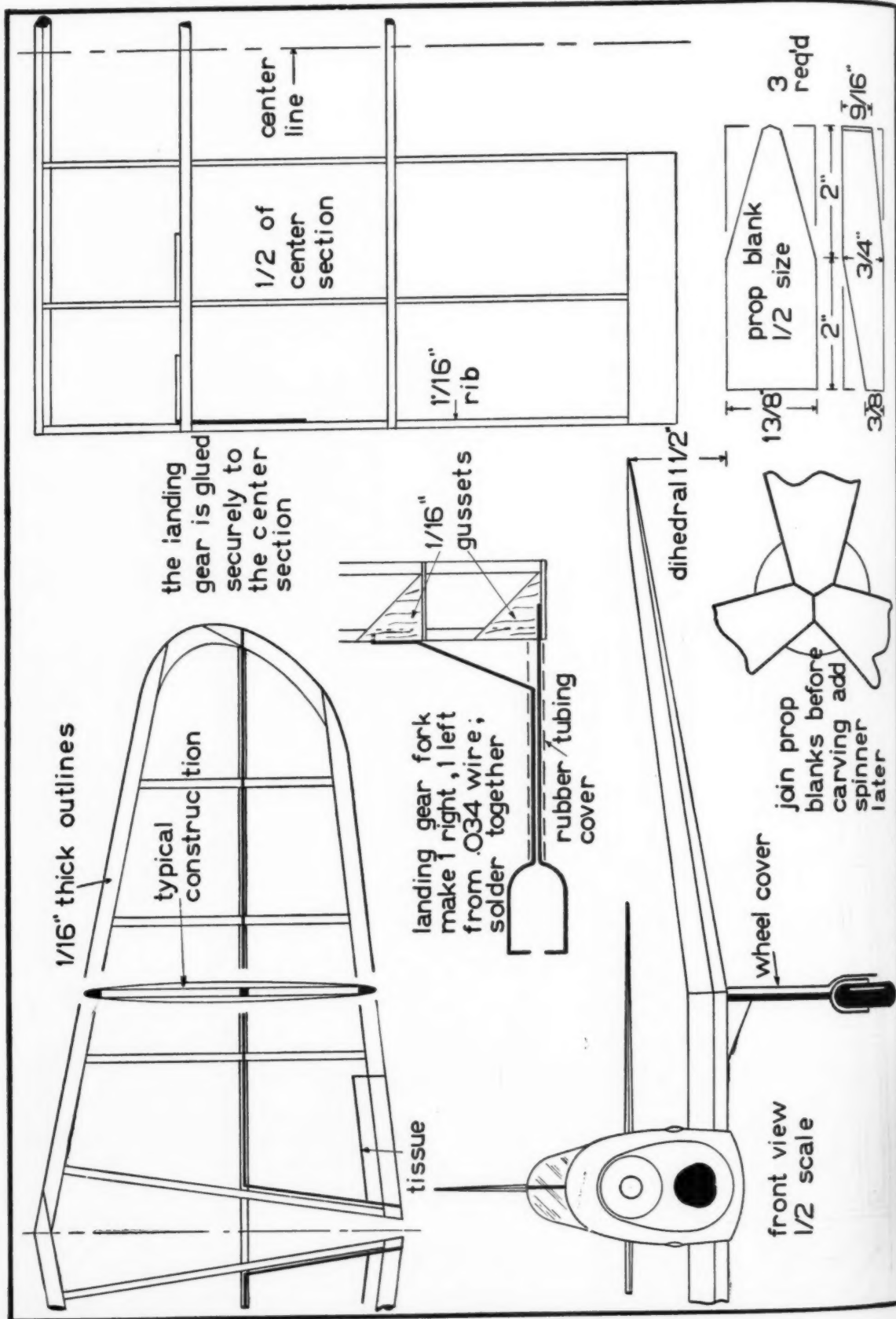


The frame is light but strong



A three-bladed propeller, though small, gives fine traction





Air Ways

News of Models and Builders in All Parts of the World

APPARENTLY the war in Europe has not affected model activities in Australia, though that country is a part of the British Empire.

Mr. R. Browne of Mais Street, Brompton, South Australia, writes and tells us that model activities in his section have not only kept pace with the rest of the world, but are growing with each succeeding day. They favor American design models and he sends us picture No. 1, which shows his Korda contest ship with which he made a flight of one minute, twenty-two seconds. The ship is shown as

it is passing overhead. Luckily, though it flew out of sight, the model was recovered two days later, over five miles from the starting point. Browne has built a number of other American models which have given excellent performances. One of these was the Grant Wakefield model.

Picture No. 2 shows one of the neatest exact scale models that we have seen.

It's a Fleet Trainer, built from plans appearing in *MODEL AIRPLANE NEWS*, by Tad Dietrich of 151 Ledge Road, Burlington, Vermont. The model has a span of seventeen inches and required about 100 hours to complete. It incorporates a detailed motor and many smaller details. We feel Dietrich is to be highly commended upon his work.

Two things which show inferior or inept workmanship on

any scale model are the guy wires and the propeller. In many cases, scale models are perfect in all respects except for these two items. The test of an expert is whether or not he can make these parts of the model realistic. In this ship the propeller is perfect, and though the guy wires do not show to advantage in the magazine picture, the original photograph in-

icated great perfection.

Dietrich tells us that he placed only third in a recent scale model contest; the judges refraining from placing him first because of a lack of internal details in the model. It is rather difficult for us to conceive of a scale model being more perfect, from an external standpoint.

Picture No. 3 comes from Geoff. W. Day, 13 Pentley Park, Welwyn Garden City, Hertfordshire, England. It shows a model of the Caudron with which Henry Struck won first place in the scale model event at the 1938 Nationals. Plans for this little ship appeared in *MODEL AIR-*
(Continued on page 64)



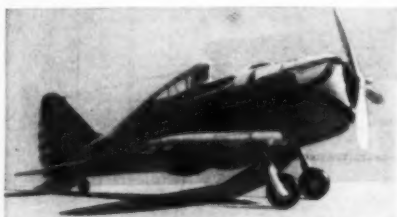
Pict. 1. R. Browne's model in flight, in Australia



Pict. 2. Tad Dietrich's scale Fleet Trainer shows beautiful workmanship



Pict. 3. A detail flying scale Caudron built by Geoff. Day. (A copy of the 1938 Nat'l's winner)



Pict. 4. Paul Lempke Jr.'s scale Seversky P-35 which won 1st place in a recent contest



Pict. 5. Joe Walsh's contest winner

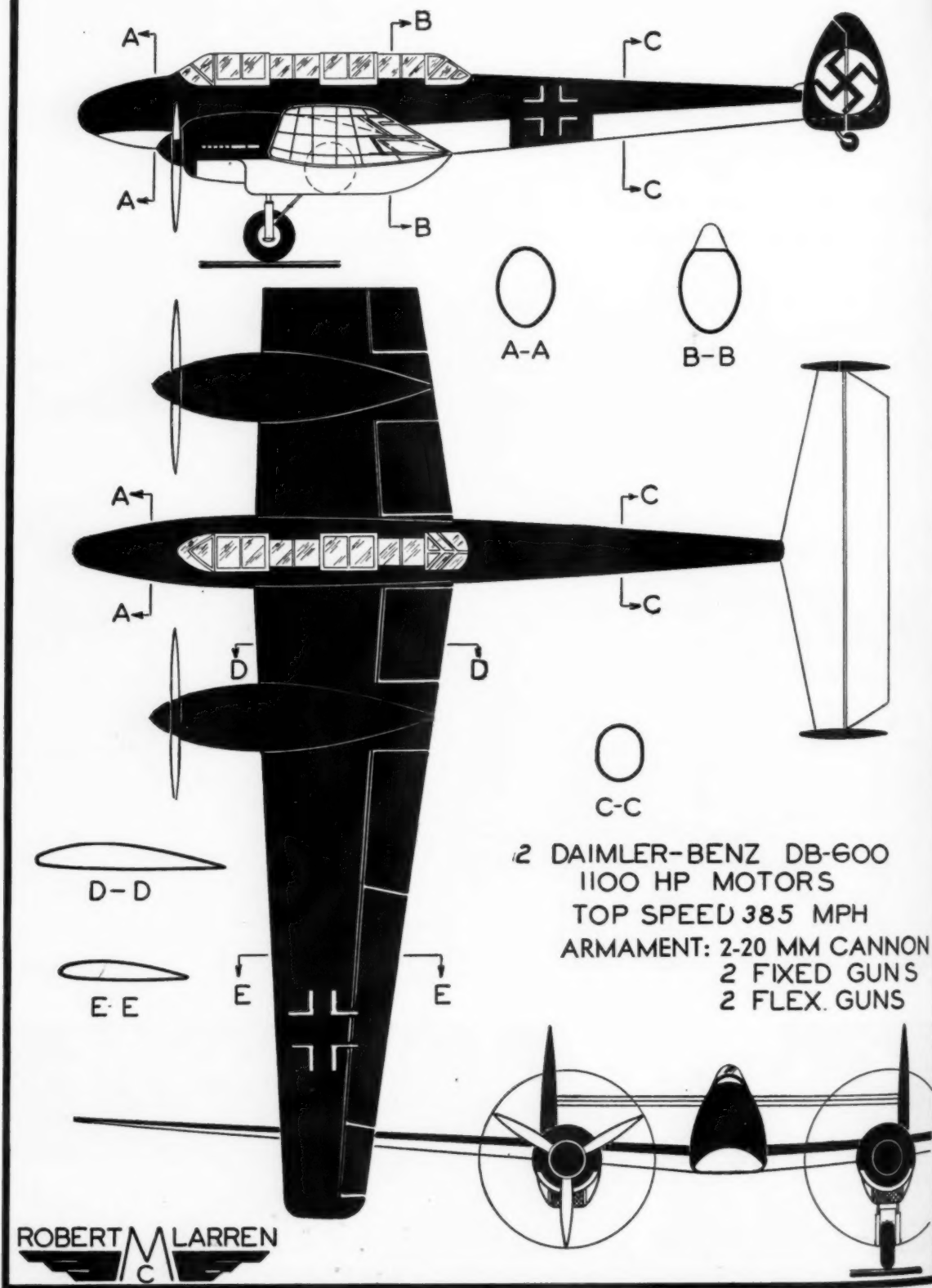


Pict. 7. Winthrop Rockefeller, sponsor of Air Youth, E. P. Warner, Maj. Doolittle



Pict. 6. An array of beautiful scale models at the New York World's Fair. They represent the various types of planes used in the U. S. Navy

MESSERSCHMITT ME-110 GERMAN FIGHTER-BOMBER



N. A. A.

OFFICIAL MODEL AIRPLANE NEWS FROM ALL PARTS OF THE WORLD

PREPARED BY THE NATIONAL AERONAUTIC ASSOCIATION, DUPONT CIRCLE, WASHINGTON, D.C.

Late News Flash!

Academy Absorbs Model Division

The most important announcement to come out of Washington since the N.A.A. first instituted a model aviation program is word that N.A.A. officials have approved the absorption of the N.A.A. Model Division by the N.A.A. Academy of Model Aeronautics.

This announcement, undoubtedly one of the most outstanding in model aeronautical history, is the acknowledgment that model aviation in the United States has come of age, and that aeromodeling enthusiasts are at last charged with the conduct, supervision and administration of official American model aviation activities.

Space and time limits prevent a detailed explanation of the "changeover" at this time. However, a few high lights of the N.A.A. Academy's first work will be: model memberships to continue at a dollar; Administrative, Scientific and Industry memberships to be set at two dollars; the reestablishment of the Academy's monthly bulletin, *Model Aviation*, and conferring of Contest Directorships, at no extra charge, upon qualified individuals who hold the two-dollar Academy membership.

Under the Academy program, the long-awaited gas model insurance plan is soon to be introduced. Further details as the program progresses will be sent directly to all model chapters and model leaders.

More than ever before, the slogan, "Of, By and For the Model Builder," will be heard along the nation's model airways as the Academy coordinates the work of all interested and eligible model airplane contestants and researchers for the advancement of the science and art of model aeronautics.

New Model Chapters

Summertime is flying time, and from where we're sitting wintertime seems to be chapter-forming time. At any rate, quite a number of new N.A.A. Academy Chapters have come along recently. Among them are the following clubs, listed first by name, followed immediately by the name and address of their contact man. If you're in the vicinity of one of these clubs, your looking them up and introducing yourself will probably pay dividends. Here they are: *Holyoke Gas Model Club*, Henry E. Moore, 141 St. Jerome Ave., Holyoke, Mass.; *West Philadelphia Gas Model Club*,

Thomas Rothera, 6039 Delancey St., Philadelphia, Penn.; *First Wausau N.A.A. Jr. Chapter*, F. E. Bachhuber, Jr., 1205 Stark St., Wausau, Wisconsin; *Westchester Gas Model Chapter*, A. D. England, 122 Briggs Avenue, Yonkers, N.Y.; *Pulaski Model Club*, James F. Cahill, 24 Bridge St., Pulaski, N.Y.; *Grunmanairs Model Club*, R. W. Folsom, 118-80 Metropolitan Avenue, Kew Gardens, L.I., N.Y.; *Allentown Gas Model Airplane Association*, George Stahl, Jr., 315 N. 10th St., Allentown, Penna.

visor for Douglas County. Mr. Bush has long been a leading figure in model aeronautics in his territory and we predict a bright outlook for Douglas County.

The Nebraska Aeronautics Commission, under the able direction of Mr. I. V. Packard, Secretary, and assisted by Mr. L. E. Tyson, Airport Engineer, is doing everything possible to help in model building and flying in Nebraska and is to be commended for its wholehearted support of the activity.

The new regulations closely parallel those adopted by N.A.A. on January 1st of this year. Permits to operate powered models are issued by the Commission to qualified modelers. The Commission also controls contests for powered models in Nebraska, arranging them so as to avoid conflict of N.A.A. sanctioned dates within the state.

Ground School Course For Connecticut Teachers

Starting in January an extension course in "The Elements of Aviation" will be offered at the Teachers College of Connecticut. The course will be under the direction of Professor Orra E. Underhill of the Science Department in cooperation with the State Department of Aeronautics, and aviation organizations. Charles L. Morris, Commissioner of Aeronautics in Connecticut, has been active in preparing this course, which is approved by the State Department of Education and is now a part of the regular state extension program for teachers in service.

Topics covered will be History of Aviation, The Pilot and his Job, Meteorology, Navigation, Types of Planes, Airplane Engines and Propellers, Aviation as a Vocation and Model Building as an Avocation. Extensive use will be made of sound motion pictures, airplane models, and talks by various speakers in the various fields of aviation, as well as visits to airports and aircraft plants. Such individuals as Ernest A. Gamache and Arthur Vhay of Air Youth of America, Charles H. Grant, editor of *MODEL AIRPLANE NEWS*, C. B. Colby, editor of *Air Trails*, and Jacqueline Cochran, famous aviatrix, have already agreed to appear before the classes to speak on various phases of aviation.

The success of this new course will determine the acceptance of a similar course for high school teachers in science, laying

(Continued on page 46)



The Scranton Anthracite Gas Model Association gets together for a banquet held recently at the airport



The Bowling Green, Ky. Model Airplane Club with some of their planes.

Quite an impressive listing, what? Drop around and say "hello" to the boys.

Nebraska Adopts New Regulations

Going into effect last January 1st, the Nebraska Aeronautics Commission has passed regulations for powered model flying in the State of Nebraska.

The state is being divided into ten districts with a supervisor for each district. Mr. L. B. Bush, leading model aircraft contest director and new N.A.A. Academy State Model Contest Director for Nebraska, was appointed by the Commission as Super-



SPECIAL TO MODEL AIRPLANE NEWS:

THE BRITISH Purchasing Commission has awarded a contract to the Douglas Aircraft Company for 250 Model DB-7B twin-engine light bombers. These will be shipped, less engines, to England, where a new-type, highly supercharged Rolls-Royce Merlin liquid cooled engine will be installed. An additional order for 400 Model DB-7 B-4 adaptations of the type already supplied to France have been contracted for by the French Air Ministry. The navy has also ordered six more C-5 twin-engine tricycle transports to be designated XR3D-2's for inter-carrier work.

Laura Ingalls was a bit embarrassed when she made a forced landing in Southern Arizona (or so she thought) recently. Mexican Custom Officials, who found her plane, informed her that she had landed near the town of Banamachi, Sonora, just 120 miles "south of the border!" She was detained a week for questioning and the filing of various papers before she continued on to Los Angeles, her destination.

Organization began early in February of the 36th Pursuit Group at Moffett Field, Sunnyvale, California. Fifty new Curtiss P-40 pursuit ships will be delivered from the factory to equip the new unit which will be made up of three fighting squadrons whose designation hasn't yet been officially announced.

New foreign orders:

Two hundred Consolidated PBV-5A patrol bombers for England.

\$7,000,000 worth of Vultee Vanguard 400-mile-per-hour interceptor fighter, 450 for England, 550 for France.

\$25,000,000 worth of improved Lockheed Hudson reconnaissance bombers for the Royal Air Force. New model has flush riveted skin, additional armament, bigger motors and a top speed much in excess of the 250 mph of the original versions.

From China, an order for North American NA-16-1P training planes.

Under complete secrecy a huge Boeing B-17B Flying Fortress took off from San Diego with Major Stanley Umstead and Capt. Leonard F. Harmon, the U. S. Air Corps ace speed pilots, a few weeks ago on a stratosphere flight to Washington, D. C. Equipped with special superchargers on the four giant engines, the huge craft, flying above 25,000 feet, negotiated the 2260-mile flight in just under eight hours.

Douglas officials branded as "false" reports that 21 Douglas Transport ships had taken part in a Russian raid on Helsinki. "Although Russia has complete license to construct the model DC-2 airliner," officials stated, "their use as military bombers is absurd. Due to their design, it would be impossible for them to be utilized for the carrying and dropping of explosives." All Junkers Transport ships, of the same general design and construction as the Model

DC-2's, were converted into German high-speed light bombers in a matter of days by the installation of rear and nose gunners and bomb bays in the fuselage cabin. And so, we wonder?

Generalized beliefs that the United States Navy has been neglected in the proposal and expenditure of sums allotted for aircraft construction will soon be altered with the authorization of \$2,276,000,000 for the construction of 145 warships and "airplanes." This vast sum should include appropriations for at least 3000 new fighting planes for the Naval Aviation Service, included in which may be new Vought-Sikorsky, Curtiss, Grumman, Republic and North American fighting ships.

Airplanes CAN sink submarines! A Vickers-Supermarine "Spitfire" attacked and sunk a German U-boat in the North Sea after a short encounter during which the British pilot dropped a salvo of bombs "in close proximity" to the submarine, after which a greenish-born oil patch forty yards in diameter, surrounded by masses of bubbles, appeared.

A new phase of Canadian airmen training began recently when 45 young Canuck R.C.A.F. students reported to Curtiss-Wright Technical Institute for a year's active duty in engineering and flight training. Other schools, it is expected, will share in this new plan for rushing Canada's pilot and technical training program.

Help for Helsinki! Italian and Swedish fighting and light-bombing planes "loaned" to the Finnish Air Force are now taking part in air attacks against the Russians, it was reported. Although their make and model number was not specified they may safely be assumed to be the latest in design and performance. The first of 40 Brewster single-seat fighters is now at the front. The first of the Douglas DB-7-B3 light bombers has been received in France and should soon be in action, it was reported. "How will they do?" is the question. We'll give you the first of the reports when they come through.

An entire battalion of fighting men was transported 400 miles from Hamilton Field, San Rafael, to March Field, Riverside, in California, recently. Utilizing 19 Douglas B-18A twin-engine bombers of the 17th Bombardment Group, 12 officers and 342 enlisted men made the trip without incident. In each bomber flew the crew of four and 10 soldiers. Nineteen Douglas C-39 Transports were also utilized.

Major Alexander P. de Seversky a-shopping in Southern California. Selecting the teeming Los Angeles aviation area for the site of his new factory, "Sascha" inspected half a dozen possible locations for his plant in which he plans to construct single-seat pursuit planes. "It is entirely within the range of American designing skill to de-

velop pursuit planes to fly at approximately the speed of sound—750 miles per hour. I have plans right now for a new design which should break the existing world's speed record for airplanes and in addition carry suitable armament and equipment for military operation!"

Establishing new unofficial speed records, a Bell P-39 "Aircobra" and a Curtiss P-40 flew from Buffalo, N.Y., to Bolling Field, Washington, D. C., covering the 340 miles in 63 minutes, and 57 minutes, respectively. Captain Ben Kelsey stated he had just "loafed along" in the flight and that "the P-40 is capable of 100 mph more than I flew it!" Add 100 to 358 and what do you get? The ships were being sent to take part in an army air corps exhibit.

For the second time in three months, Captain W. E. Larned, assistant flight superintendent for United Air Lines, set a new altitude mark for Douglas DC-3 transport ships when he climbed to 29,300 feet recently. In the interest of the University of Chicago research studies in cosmic rays, the huge ship bested its own mark of 28,900 feet set a few weeks ago.

The French airline Regie Air Afrique has placed an order with the Lockheed Aircraft Corporation for three "Lodestar" transports. At a cost of \$260,000, the new ships will be used on the line's main route leading from Marseilles across Africa to the Island of Madagascar.

Bell Aircraft has developed a new type machine gun adapter which so improves the aim and ease of operation of .30 and .50 caliber machine guns that both the army and navy air services have decided to make the adapters standard equipment on all fighting planes.

Biggest aircraft business being done today is not by a plane-building firm. Pratt & Whitney Aircraft Division of United Aircraft has the biggest backlog in the industry. Latest award is for \$3,005,600 worth of model R-2800-7 twin-row Wasp Senior and Model R-1340-51 "Wasp" engines to power new army and navy bombers, fighters and service ships.

With orders for five ships already booked, the Aircraft Corporation of La Porte, Indiana, completed test flights on its new high-wing, two-place light cabin plane recently.

Four air corps officers and enlisted men were killed in the crash of a huge Douglas B-18A twin-engine bomber within sight of its destination, March Field, Riverside, California, recently. Storm-tossed and off their course for hours, the four victims were hurled through the air and wreckage scattered over an area two hundred yards in diameter after the ship hit a mountain.

Germany's aircraft industry begins to feel the first pinch of war. A shortage of aluminum, while not acute, is forcing an economy program in Germany's aircraft plants. Rubber and tetra-ethyl lead for high octane fuel are also being rationed out, it has been reported. Six months should find the Germans hard-pressed for these necessities of fighting warcraft. England's Hawker Hurricane fighter and Vickers Wellington Bombers are of wood and fabric construction, an adequate supply of which is always assured even in wartime. Thus does the war, as all of them do, settle itself down to an economic battle.

Model Art

(Continued from page 9)

are trying to depict. If you wish to represent a plane cruising along the air lanes, a quiet cloud scene would be the proper background. A few hangars, an administration building, or some mechanics will add much realism to your airport scene. However, if your weakness is drawing, a plain sky-blue panel will suffice.

Modelers with a yearn to wield a brush will take to this type of work naturally for it affords ample opportunity for artistic talent, and you will find the building of picture models an ideal project to while away those lazy afternoons. Perhaps the most enticing property of these models is that they are a good source of income. So far every person who has seen the original model has asked me to build one for them. For my enterprising young modeler this is an ideal opportunity to combine pleasure with the chance of raising the expenses of his next gas job. And most important of all, the construction is so simple that it presents no problems even to beginners.

Do not let this opportunity go by, so out with your razors and let us get started. First select the panel or board on which you will mount your plane. This may be of any material and size. For the Grumman F2F-1, for which the drawings are herewith published, a cigar box cover was used with success. From the three-view drawings of the airplane select the view you wish to represent. Although the instructions that follow are for a side view and pertain especially to the Grumman F2F-1, they are general enough to cover the various views and types of planes possible.

No dimensions are given on the drawings and all instructions give approximate sizes of material for a model of a fuselage length of 6-1/2". Thus there are no restrictions on your part. You may use any scrap wood that you have and you may make the model as large or as small as you wish. If you believe that the model looks too flat, try using thicker wood for the fuselage. Remember to center the model well on the panel when you assemble both units. The airplane does not necessarily have to be on an even keel but it will be interesting to tilt the plane so as to simulate a diving or climbing attitude.

Trace the outline of the fuselage and rudder on about 1/4" flat sheet balsa and cut it out. With a razor shape the various cross section forms on one side only in order to give a rounded effect. The rudder is given an airfoil shape on one side only. In order to create a good three-dimensional effect the wings must project out a few inches. About 2" is sufficient for a model of the Grumman's size. Cut the wing and tail out of flat sheet of suitable thickness and sand to an airfoil shape. Make slots in the fuselage for the lower wing and the tail. With a pointed instrument score the outlines of the enclosed cockpit and the retracted wheel on the fuselage.

The various parts are now ready for painting. They should first be sanded smooth and treated with several coats of

clear dope. Mix the colored dopes thoroughly and dilute them with thinner until they can be brushed on smoothly. The panel presents the most difficult problem from the artistic viewpoint: you can paint it sky-blue however and escape all difficulties. The more ambitious modeler can paint realistic clouds, sunsets, etc.

Glue the fuselage securely to the board and then glue the wings in correct relation to the fuselage. If you are building the Grumman, attach the lower wing in the slot previously made for it and give it some dihedral. Put in the tail, and then attach all struts. When everything is dry, touch up the joints with paint and hang the picture model on the wall. The effect it will have on the appearance of your club-room or den will be ample reward for your labor.

Cloud Chasers

(Continued from page 13)

not enough "side" instructions are given to help make a successful ship. The glue furnished is but a scanty portion and no allowance is made for broken balsa strips or torn tissue. Of course the manufacturers must keep the kit parts down to a bare minimum; but are they not defeating their own purpose in not furnishing a bit more than necessary? Otherwise if a beginner's first ship is never finished and the modeler becomes discouraged, a future customer is lost.

Again, the model magazines publish the plans for ships each month and show beautiful pictures of the completed model—yet there is not enough information about construction for a beginner. Only an expert could duplicate the plans or the ship. Since the large percentage of model magazines reach the hands of the youngsters or beginners, would not more detailed instructions help the cause?

It all boils down to this: What can we older and more experienced modelers do to help our younger brothers or the boys back in the hills or on the farms that have the urge to build models but cannot join clubs or receive personal supervision?

All of these thoughts passed through my head while returning home from that afternoon's ride.

Next Saturday morning, while in the midst of office work, one of the aforesaid new friends telephoned and asked if we cared if he brought some other boys along that evening to see our workshop. I had nearly forgotten that it was the evening set for our get-together. The next phone message came from the wife who again reminded me that we had better secure some pop corn for our guests as she knew from experience that boys like pop corn nearly as well as model planes. And of course we stopped at a model store and purchased a gas kit which we had seen described in our model magazine.

At seven sharp the door bell rang, but we were hardly prepared for the contingent that filed in... at least twenty youngsters was the grand total. We led the way to the workshop and had each one "grab" a chair from various parts of the house. Meanwhile a big bowl of apples and a dishpan full of pop corn appeared from the kitchen.

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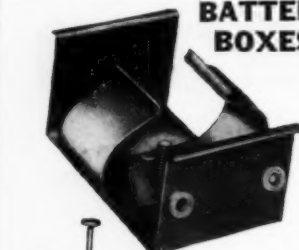
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The gas model kit, which we had purchased, was mentioned and the suggestion made that they might like to see just how an old-timer went "at it." This plan met the approval of all concerned and the bench was cleared. They surely give you a lot of parts with the kits these days—a prop already carved, air wheels, ribs and bulkheads printed on balsa, bolts and colored dope and many other items. We looked over the plans and secured a general idea of the various parts that went to make up the model and also see if there was enough proper sized wood to be used where required. We laid the 1/4" square wood in one pile, noticing that the balsa was of harder composition. The other sizes were picked out and placed in order. In this way we wouldn't use 1/16" square wood instead of 3/32" square wood, etc.

The plans called for a fuselage of 1/4" strips and cross-braces built box-like with rounded formers on the top and bottom. Let us first cut two of each of the various cross-braces by laying a strip on the plan, cutting it exactly and then making a duplicate of it even to a hair's degree in length. Mark a number (1) on the plans and a (1) on the two corresponding strips. Cut the remaining cross-braces of the fuselage in the same way; two of each for top and bottom braces and two of each for the sides of the fuselage and mark their respective numbers in pencil on the wood and also on the plan. In this way the proper length braces can be easily picked out and placed where they were cut to go.

Now the next step, and one which few modelers take the time to follow, is to put a prime coat of glue on the ends of each of the braces and allow to dry. The glue will soak into the wood and when the next glue is put on and the brace put in place, it will hold. It is embarrassing to say the least to have a ship fall apart on the first landing.

Next, let us take a piece of wax paper from the roll in the kitchen, one long enough to cover the entire plan of the framework of the fuselage. Lay it flat with no wrinkles on the plans over your smooth and level workbench or board. Incidentally, if you have no workbench large enough, a flat board which is smooth, placed on a bridge table, makes a good workbench. Place the 1/4" longerons directly over the plans and pin on each side of the strips to hold in place. Since the plans call for a bend in the end of the strip, soak the bent portion under the faucet for a minute. It is less apt to crack and when dry will hold the curve better and there will be little or no warping. We are making but one side of the fuselage at a time and by now the glue-tipped cross-braces can have another coat of glue and be put in their respective positions. Be sure that the whole framework has a chance to dry for two or three hours in a flat position on the workbench.

As the apple supply was low and the pop corn gone, we proposed that we adjourn until our next meeting when we would try to make more progress than on our first night.

Meanwhile, all you fellows who have run into problems, make a note of them

and we will see if a solution can be worked out at our next monthly meeting. If it is O.K. with you, we will try to make the other side of the fuselage before you come again. It is done exactly as we have done tonight, using the same pin holes to hold the form together as we used for the first side. Notice that we did not once put a pin through the wood but rather pinned each side of the strips to hold the form. Pins through wood, unless necessary, are apt to split the balsa wood and we do not want any weak places in our ship.

The Physics of the Airplane

(Continued from page 11)

volume equal to that of a sphere of 15 foot radius. What is the gross weight which the craft will lift when the density of the atmosphere is 2 pounds per cubic yard? Note: 15 feet equals 5 yards.

Then the volume of the balloon is

$$\frac{4}{3} \times 3.1416 \times (5)^3 =$$

3

$$\frac{4}{3} \times 3.1416 \times 125 =$$

3

$$523.75 \text{ cubic yards.}$$

Weight of air displaced by the balloon (volume multiplied by density) = $523.75 \times 2 = 1047.50 \text{ lbs.}$

The most efficient gas for the inflation of lighter-than-air has been stated to be hydrogen gas. A cubic meter of hydrogen weighs 0.009 kilograms, while a cubic meter of air weighs 1.29 kilograms. Consequently, the buoyancy of hydrogen is computed to be 1.29 — 0.009 kilograms per cubic meter. Hydrogen gas, however, is very inflammable, particularly when it unites with the oxygen of the atmosphere. For this reason its function as the lifting agency for lighter-than-aircraft has been vigorously discouraged in recent years—in fact, an Act of Congress prevents its employment in the United States for these functions. Helium gas has been adapted as a substitute for hydrogen under these conditions. While it is four times as heavy as the latter gas, and considerably harder to obtain and refine, helium performs well, and, most important of all, is absolutely non-inflammable. Since the United States maintains a virtual monopoly over this gas and its potential military value, the recent request of the Nazi Government was rejected on the grounds that it would be put to uses of destruction of human life rather than errands of peace.

A balloon is never fully inflated at the start of its operations but expands as it rises, since the pressure exerted by the atmosphere on its outside surface diminishes. The buoyancy then decreases slowly as the balloon ascends into a rarer atmosphere. Should the envelope be fully inflated to begin with, the internal pressure of the gas at a high altitude would exceed that exerted by the atmosphere outside. This condition would ultimately result in a rupture of the envelope.

Since air possesses weight, the enormous mass of the atmosphere surrounding the earth, must as a consequence, exert a pressure. Since atmospheric pressure is not a constant quantity but varies widely over different locations and even from

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hour to hour in the same location, it becomes accepted as a reliable criterion for approaching weather changes. In order to record accurately these variations in barometric pressure, the barometer was developed by the early physicist, Torricelli. Embodying the refinements developed throughout the years, the barometer at present represents one of the most important instruments connected with scheduled air transport operations, both commercial and military.

The mercury barometer consists of a "J" shaped glass tube attached to a supporting standard. A pin hole is provided in the short arm for the admission of air. The tube is filled with mercury, a vacuum existing above the mercury in the closed portion of the tube. Thus the weight of the column of mercury located between the level of the mercury in the closed section and the level in the open section is sustained by atmospheric pressure on the fluid in the open section. Thus the length of this column provides a measure of the atmospheric pressure. When determined at sea level, the length of this column of mercury is 76 centimeters. Standard atmospheric pressure is then taken as the equivalent of 76 centimeters of mercury for a definite temperature and location. Since the density of the mercury at this temperature (0 degrees Centigrade) is 13.596 grams per cubic centimeter, the equivalent in English units is given as: $13.596 \times 76 = 1033.33$ grams per square centimeter.

This is equivalent to 14.7 pounds per square inch.

The aneroid barometer finds wide application in the field of aeronautics. See Figure 1. It consists of an air-tight box having a corrugated top. Most of the air has been evacuated from the metal container so that its internal pressure is lower than that of the outside atmosphere. The upper portion of the container constitutes a flexible diaphragm which moves inward and outward as the pressure exerted upon it shows variation. The inward movement occurs as the pressure is increased, the outward movement as it is decreased. Though slight in effect, these movements are magnified by a system of levers attached directly to a pointer which moves over a dial, suitably calibrated to indicate minute changes in pressure.

EXAMPLE: An aneroid barometer reads 75 centimeters of mercury sea level and 60 centimeters at an observed altitude. What is the observed altitude? Change in pressure $75 - 60 = 15$ centimeters of mercury;

$15 \times 13.56 = 203.40$ grams per sq. centimeter.

Altitude in centimeters = $203.40 \div 0.001293$

157,000 centimeters.

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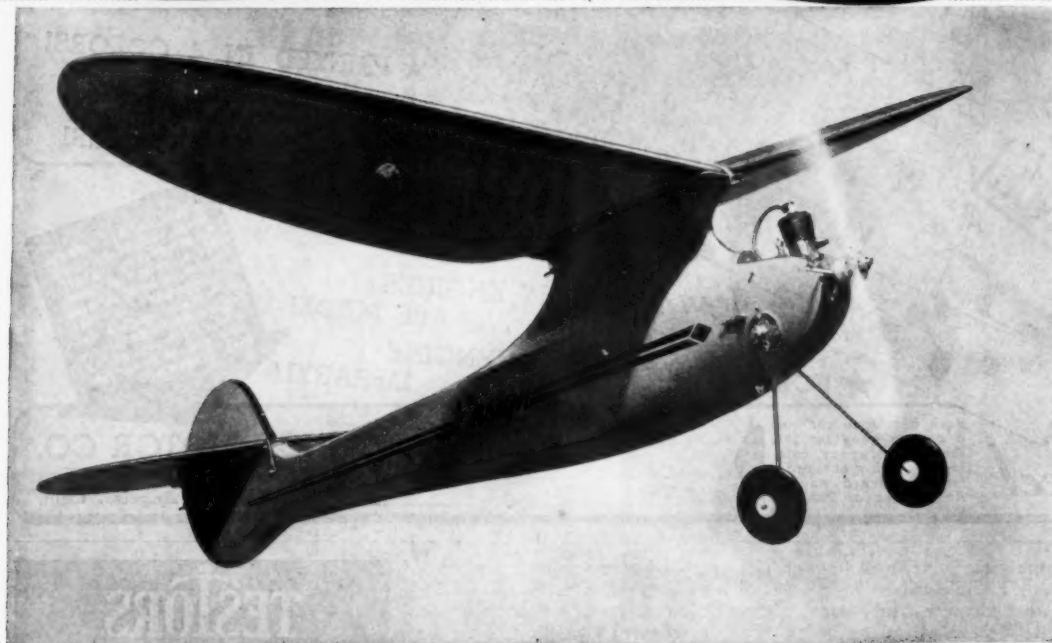
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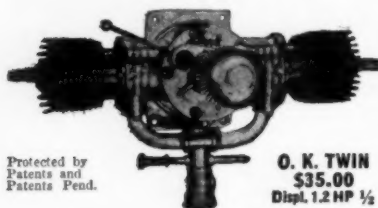
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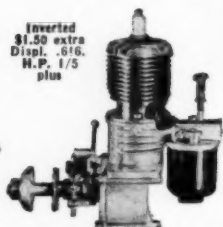
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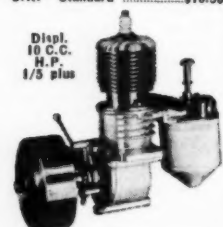
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presages settled fair weather. We have already observed that the barometer can be employed to accurately indicate difference in altitude. A simple empirical rule for the determination of altitude by progressive barometer readings allows .10 inches for every 90 feet of increase in elevation. This method, however, loses a great deal of its reliability as high altitudes are attained because of the corresponding decrease in the air density.

Airplane performance is influenced by the altitude. It is customary to estimate airplane performance or engine performance for sea level density. The density at sea level is equivalent to a barometric pressure of 29.92 inches at a temperature of 60 degrees. The sea level density at this temperature is equivalent to 0.07610 pounds per cubic foot and the volume equal to one pound of air at this temperature will occupy 13.41 cubic feet. The density at 5000 feet is 0.06320 pounds per cubic foot and at 10,000 feet the density is equal to 0.0523 pounds. In the United States, 10,000 feet is the critical altitude. Airplane engines are boosted by super-aspiration to this altitude to maintain sea level density performance and beyond this height to taper off as is to be expected in their output. Inasmuch as the air density decreases with an increase in height, aircraft performance calculations must take this into effect and include the factor of density if they are to be accurate. The letter (Greek) Rho symbolizes this. In the lift equation for airfoils, the term mass density is included for this specific purpose and the mass density at sea level is equal to a factor of .00237 or in the case of "mass density" in the lift equation to be = $\frac{.00237}{2}$ or .00118. Likewise, the land-

ing and take-off velocities as well as the flying speed are corrected for altitude in all performance computations.

Atmospheric pressure is a pertinent factor which occupies a prominent part in the preparation of weather maps. Points of equal atmospheric pressure within a specific locality are plotted and joined by lines drawn upon the map to form an irregular curve and this is designated as an "isobar." Cyclonic storms, which are of particular concern to aviators, have low-pressure centers completely surrounded by areas of high pressure. The actual center of such a disturbance is established by the lowest barometric tabulation. The wind direction is from the areas of higher pressure toward those of lower pressure. However, in the Northern Hemisphere in which many of us reside, the rotation of the earth on its axis tends to deflect winds blowing from high- to low-pressure areas to the right. This condition imparts a counter-clockwise rotation to a cyclonic storm. As a general rule, cyclonic storms usually cross the northwest boundary of the United States from British Columbia. Their direction is then southeasterly until the Rocky Mountains are crossed. At this point they swerve in a northeasterly direction toward the Atlantic seaboard. Storms originating in the Gulf of Mexico generally move up along the Atlantic coast toward the northeast. Cyclonic storms are not to be confused with the harmful disturbance known as the tor-

nado or line squall. These two latter aerological dangers fortunately are not as prevalent as the cyclonic storm.

If we were asked to enumerate briefly the principal physical characteristics of pure, dry air, our reply would include the following: Air is odorless, colorless and tasteless. It is extremely elastic and a given mass will tend to occupy all available space; as it expands, it cools; as it is compressed, it rises in temperature. From the foregoing it immediately becomes obvious that air is compressible. By that statement we mean that it can be made to occupy only a small portion of its original volume. This is a characteristic peculiar to all gases and one of the important factors that differentiates gases from fluids. The next logical question which arises is: How far can we go in compressing or expanding a gas? What physical limitations are imposed on these mechanical processes?

The limitations imposed on these processes are dictated by Boyle's Law. This law expresses the relation existing between the pressure and volume of a gas at a constant temperature, and which states that: "At a constant temperature, the volume of a specific mass of gas varies inversely as the pressure to which it is subjected." This law applies to all gases. Expressed in equational form, Boyle's Law reads:

$$p_1 v_1 = p_2 v_2$$

a constant where p_1 and v_1 denote the original pressure and volume, and p_2 and v_2 denote the final pressure and volume. This can also be stated:

$$\frac{p_1}{v_2} = \frac{p_2}{v_1}$$

Note the inverse proportion, the product of the volume of the gas and the corresponding volume remains constant for the same temperature. This relation modified for temperature changes becomes of primary importance in governing the behavior of the combustion of gases in aircraft internal combustion engines. It is to be borne in mind that some gases tend to liquify at definite values of temperature and pressure. Boyle's Law does not hold for these specific values of temperature and pressure.

EXAMPLE: An air starter installed on an aircraft powerplant incorporates a tank containing 50 cubic inches of air under a pressure of 200 pounds per square inch. While under test the air is permitted to expand until the pressure is reduced to 20 pounds per square inch. What is the new volume occupied by the air?

$$p_1 v_1 = p_2 v_2$$

$$200 \times 50 = 20 \times v_2 \therefore v_2 = \frac{10,000}{20}$$

500 cubic inches

Further applications of Boyle's Law in the field of aeronautics are represented by the force pump and the vacuum pump. The former device is widely used for maintaining the supply of fuel to the carburetor of airplane engines, for maintaining adequate pressure in engine lubricating systems and other devices. Vacuum pumps are also installed on airplanes, being invariably engine-driven. They are employed to scavenge used lubricating oil

from the engine pumps after it has completely passed through the circulating system and to actuate many types of flight instruments, notably the gyroscopic turn and bank indicator.

Frequently force pumps are employed to measure the volume of the liquid they are delivering. The gas pump which is to be seen at any airport is an example of this type of device. Another pneumatic device widely applied to aircraft manufacturing purposes is the riveting gun, either squeeze type or else pneumatic hammered type.

Something else to mention before this article is finished is the term "manifold pressure" as applied to engine operation. Many of the modern airplane engines are supercharged for take-off purposes to about 25 per cent more than their normal rated operation output. The control of supercharging is affected by a control of the intake manifold pressure. This pressure is read directly on an instrument in the cockpit and is usually calibrated to represent some definite value of "inches of mercury" or its equivalent. This instrument is similar to a barometer in its operation and registers the pressure at that instant in the intake manifold. The pilot knows the maximum safe manifold pressure that can be used for boosting the engine and as long as it does not exceed this safe limit, no dangerous effects can damage the motor.

A typical air starting system is shown in Figure 2. These starters have proved to be entirely satisfactory and have been employed upon medium power aircraft with success.

Hornet of Defiance

(Continued from page 13)

skin of sheet Alclad or "Elektron" as it is known there. Flush riveting has been employed throughout, the entire surface being coated with an aluminum paint which presents an extremely smooth surface to the airstream.

The wing is built up on two spars of the sheet web flanged cap-strip riveted design. Ribs are in two pieces, the rear spar passing through cutouts, the front spar anchoring the ribs into place. The center section is comparatively wide extending well past the landing gear support castings as is usual practice. From this point out, the two outer panels have a pronounced dihedral and taper culminating in well rounded tips. Flush riveted stressed skin has been used as a covering. The ailerons are of the Frise type and are hinged and controlled from the under side. Flaps of the split type are included in each outer panel and along the center section to the fuselage.

The landing gear is hydraulically operated by a direct mechanical control to the hydraulic pump which forces the fluid through to the operating cylinders located inboard of the landing gear hinge points.

Large metal plates hinge at the wing and, together with smaller plates secured to the wheel fittings, fold upward and inward to completely seal the landing gear openings in the full retracted position. Operation, being positive, requires no elaborate signalling device other than a

mechanical position indicator and an emergency hand pump for use should the hydraulic lines or mechanism be damaged by enemy fire. Lowering the landing gear is entirely mechanical, being accomplished by the extracting of pins in the up position latch. The tail wheel is of the fixed, single strut, forked type with a full swivel of 360° in the conventional manner.

The engine mount is of welded chromemolybdenum steel tubing. This frame is bolted to the main fuselage longeron fittings at four points at the firewall.

Power is supplied by a service type Rolls-Royce "Merlin" Mark II which develops 1,030 horsepower. However, it is understood that certain models have been fitted with the Merlin R.M.2.S.M. two-speed supercharged engine operating on 100-octane fuel which develops 1,145 horsepower at 16,750 feet. In this event, it may safely be assumed that wartime production models will be equipped with the larger engine.

The oil, upon leaving the engine, is routed through a filter unit and into the cooler which is mounted horizontally beneath the engine fixed cowl just forward of the firewall.

The coolant for the engine, a Prestone equivalent, is piped rearwards to the main coolant radiator located beneath the belly of the ship amidship. It is of the open passage type in that the intake and exhaust ports for the air are of the same cross-sectional area and there are no shutters or controls for its operation.

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with but one consideration, the power-driven turret. Untried to date, the Defiant was selected as the ship upon which an initial production installation of this new aerial weapon should be made.

In simple terms, this new turret, a favorite of Air Minister Sir Kingsley Wood and upon whose approval this new adaptation was made, is rotated by power supplied through gearing from the engine. In this way, the rear gunner sits within the turret on a seat and foot pedestal which are integral parts of the assembly and controls the gun movement and turret with a small handle located on his left. His guns are, of course, mechanically raised and lowered, having a travel of only nine inches above the horizontal and five inches below.

In order to give the gunner the very best installation possible, something of value had to be sacrificed, which, in this case, appears to be the pilot's view and comfort. Located high and forward, the pilot's head is covered by a tiny, glassed sliding hatch which is very near form-fitting.

The cockpit is equipped with a main instrument panel with the conventional flight and engine instruments, an electrical sub-panel for the control of the engine ignition system, panel lights, wings lights, etc., and a main control shelf located on his left upon which are mounted the throttle, propeller pitch control, hydraulic control unit, landing gear operating handle and flap operating handle. On his right are the handles for the two parachute flares located in racks in the rear aft section of the fuselage, two pyrotechnic pistols for use as signals and the main control switch for the gunner's turret.

The rear gunner is located within the turret in such a manner that he is strapped into a seat which is part of the turret itself. He has no instruments or switches of any sort other than the one main power control handle for his turret.

Armament with the rear turret is made up of two heavy duty 23 millimeter aero cannons mounted vertically within the turret slot. These are movable in only a vertical direction and may be fired separately. Shells for these guns are mounted in racks within the turret itself so that the gunner and his equipment are all situated in a self-contained unit.

Provisions have also been made for the installation of a single fixed machine gun firing through the propeller and located on the pilot's right within the cockpit. Blast tubes route the shell along the engine cowl where it emerges from a louvre in the upper removable cowl at the nose. This gun is of the Browning electrically controlled 30 caliber model. Two wing guns are installed, one in each center section just outboard of the landing gear hinge pins, of the 50 caliber rapid fire type.

The Defiant has a wing span of 39 feet 6 inches and a length of 30 feet. Thus we see that the ship is very little larger than the standard Hurricane single seat fighter. It has a height of 12 feet and the De Havilland three-bladed variable-pitch airscrew has a tip clearance of 12 inches in the horizontal position. The wing has an area of 250 square feet.

The Defiant has several new and unique

features. The exhaust stacks are of the new "ejector" type which forces the exhaust out of them rather than having a pressure differential suck it out. The wing tip lights are of smooth contour being encased within the wing leading edge and forming a portion of it. The wing section is abnormally thick at the root along the center section and tapers in thickness rapidly as it nears the tips of the outer panel. The tail surfaces are statically balanced by large horn weight balances located within the fuselage rear bulkhead. They are of symmetrical section and the elevators and horizontal stabilizers are thus interchangeable.

Performance figures of a preliminary design nature were released for the prototype several months ago and we give them with the warning they should serve only as a criterion of the completed wartime production models which will have larger engines and extensive refinements of design and construction. Top speed for the prototype Boulton Paul Defiant is 315 miles per hour, cruising speed 276 miles per hour and landing speed 61 miles per hour.

The original Defiant had a service ceiling of 27,500 feet and an absolute ceiling of 30,450 feet.

Fuel capacity is 157 imperial gallons of 87 octane fuel located in two main center section tanks. Oil capacity, located in the oil tank mounted in the upper portion of the engine compartment just forward of the firewall, is 14 gallons throughout the complete system with provisions for only 12 gallons at any one time within the tank.

Range of the Defiant is given as 840 miles with a 20 miles headwind in both directions.

This new war weapon is untried of course and several problems remain to be solved before it has proven its worth in actual combat. In a study of its design we see that several items are noteworthy, particularly the location of the gun turret in the center of the ship which relieves the gunner of much injurious acceleration when maneuvering. The pilot's hatch, while small and not particularly given to good observation, is well streamlined and offers a minimum of head resistance.

Main fighting tactics of the Defiant are, according to Air Ministry authorities, the engagement of heavy-duty enemy bombers. The Defiant's aim will be to maneuver alongside and slightly below the enemy to place the gunner in a good position. Once the power-driven turret and shell guns are in operation, the Defiant will need no defense. Such an aerial broadside should annihilate an enemy bomber and with its heavy forward armament the Defiant should be able to successfully fight off any escorting fighters in short notice. By virtue of its high speed, estimated to be nearly 350 miles per hour in the final production model, the Boulton Paul Defiant should truly shriek a note of aerial defiance to enemy raiders. May it solve the triple problem which has been entrusted to it.

Build A Model Defiant

Main keynote of the Boulton Paul Defiant is the power-driven rear gun turret located amidship atop the rear fuselage.



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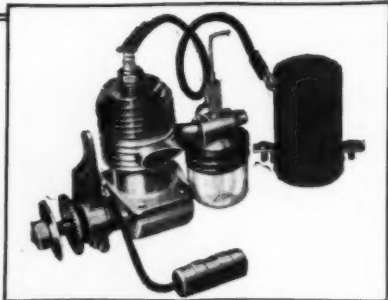
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Concentration on this particular item should give you an excellent model if, upon completion, you have not neglected other parts of the Defiant's anatomy.

Select a good grade of balsa for the fuselage 6-1/2 x 1-1/4 x 3/4 inches and cut to shape. Use the exclusive MODEL AIRPLANE NEWS silhouette templates for correct fuselage curvature and sand to shape.

Wings are cut from balsa blocks; two 1-1/2 x 2-1/2 x 3/8 inches and one 1-1/2 x 3-3/4 x 3/8 inches for the center section. Use template DD for the center section and taper the outer panels to a tip shape of Template EE.

The tail surfaces are cut from sheet stock and sanded to shape. They are of symmetrical airfoil section and may be made flat surfaced.

The rear turret is best turned out on a lathe, but a satisfactory job can be done with a balsa block 1/2 x 5/8 x 5/8 inches and several grades of sandpaper.

The landing gear should be built up after the other assemblies are cemented in place. Paint the shaded portions of the nose cowl, as shown on the drawings, a flat black, and the remainder of the ship a brilliant aluminum or silver. The conventional Royal Air Force insignia may be purchased or painted on as required. A coat of clear lacquer sprayed over the entire ship upon completion will give your model of the Boulton Paul Defiant the realistic appearance of the Hornet of Defiance it is.

Build and Fly The Caudron War Plane

(Continued from page 23)

The entire nose, forward of the leading edge of the wing, is covered with sheet balsa. Because of its somewhat difficult shape it will be necessary to use numerous strips of soft 1/32" balsa for this job. Start at the top and plank the nose carefully; cementing the covering to all of the adjacent frame. Naturally the junction between each strip should be cemented neatly but thoroughly. Several rubber bands and plenty of pins will aid in keeping the covering in place until dry. Make the front nose block from medium balsa and accurately cut the square hole that accommodates the nose plug. Cement the block into place and carefully cut and sand its shape to blend with the contours of the sheet-covered nose. Sand the nose, too, so it can be smoothly covered with paper.

As an alternate method of making the nose, a solid block of balsa can be carved to shape and then split in the center to permit its being hollowed out. Take your pick—we like the sheet-covered method best.

The wing's center section is now assembled to the fuselage. To do this it will be necessary to temporarily remove several of the vertical members of the fuselage. Slip the center section into place; the bottom spar should rest against the main longerons, and the trailing edge is lowered to the position noted on the plan. Do this carefully since the wing's correct incidence depends on your accuracy. Solidly cement the unit in place and replace the vertical members to their original positions.

The landing gear is made from .034 music wire. A full-size layout is provided so little difficulty should be experienced. Notice that the one piece of wire is bent to take side forces while the other runs parallel to the wing rib (see side view) to absorb force and aft shock. Polish the wire with fine sandpaper to aid in making a neat soldering job. Use just a bit of soldering flux and neatly join the two pieces into one unit. With strong silk thread bind the one

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wire to the lower spar and with a needle sew right through the rib and about the spar to fasten the other wire. Apply several coats of cement, add the 1/16" thick triangular gussets and your Caudron will take the roughest of landings.

Tail Surfaces

Since movable controls are of little or no value to a flying scale model they have been eliminated. The long tail moment arm will make light tail surface construction imperative. The rudder and stabilizer are made in a similar way and the entire stabilizer is made in one piece for added strength. Make the tail parts, first of 1/16" sheet outlines and 1/16" square spars and ribs, and when dry cement additional strips on both sides to form the streamline shape. Despite the light weight of these parts they won't warp readily.

Propeller

A semi-scale three-blade propeller pulls our "Cyclone." The blank is shown one-half size on the plan and three are needed. Join the blanks together, as detailed, before starting to carve the blades. Finish the back surfaces first and then reduce the blades to the proper thickness by carefully cutting away the front of the blanks. Round the tips neatly. The spinner is cut in such a manner as to reinforce the hub. Being so large, it will be easy to add a free-wheel device, if the cap of the spinner is hollowed out somewhat. Polish the blades to a smooth finish by applying several coats of clear dope; sandpapering lightly between each coat.

The nose plug is made to fit the hole in the nose block. Cut the front disk from 1/32" birch plywood—it can be obtained at most any model supply house. The back part is hard balsa. Drill a small hole through the center and cement washers to both sides so the propeller shaft will turn smoothly.

Bend a prop shaft from .040 wire. Place several washers between the nose plug and propeller. Imbed the front end of the shaft in the prop and glue well, or if a free-wheeler is used bend the wire accordingly. Cement the spinner cap in place and the unit will be complete except for coloring.

Covering

To properly prepare for a fine covering job, the whole model must be sandpapered to remove all roughness. It is best if only those members of the fuselage which run from nose to tail touch the covering, so wrap a piece of sandpaper about some round object such as a pencil, and sand all formers to a scalloped shape. Colored paper is used because it is attractive, and its use will help reduce the total weight. Our test model is colored red and yellow but the planes now fighting in France are probably camouflaged. Colors used to camouflage pursuit planes are brown, green and yellow. From thin celluloid, cut the side windows and cement them in place. Banana oil is a good adhesive with which to attach the paper. Use numerous small pieces of tissue to cover curved parts such as the fuselage; the nose and other sheet balsa parts are covered with the colored tissue, too. Use individual sheets for each side of the wing parts; tips require separate pieces also. It is not necessary to fasten the paper to

all of the structure—attach the outer edges only. With an atomizer lightly spray water on to all the covering, pinning the wing and tail surfaces to a flat surface to guard against warping. Our pursuit is now ready for final assembly.

Assembly

With the aid of cans, bottles, etc., block the fuselage into flight position so the plane can be assembled accurately. To insert the stabilizer in place it will be necessary to cut the tail post and former number 10, so they can be sprung apart. Once the stabilizer is correctly placed they are recemented to

their original positions. Offset the rudder slightly to counteract torque. Block the wing tips up to 1-1/2" dihedral will be had; double checking to ascertain that the incidence of both outer panels is exactly the same, and then cement the wings fast. Wheels should be of hard wood since the added weight will aid in making flights more stable. Cement bearings to the wheels so they will revolve smoothly. The landing gear forks will spring apart far enough to admit the wheels. One or two coats of light dope are brushed on the whole model—do this in a dry room to keep the dope from blushing. Color dope the wheels, pro-

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THE ROLLS ROYCE OF GAS MODELS
 72" span; complete with silk covering, cement, dope, but minus wheels, prop and motor..... **\$19.95**

GET OUT AND FLY!

BOYS: Send for FREE illustrated folder of WITKIT models, and FREE information about joining "Model Fliers of America"

WASHINGTON INSTITUTE OF TECHNOLOGY
 Airplane Division
 McLACHLEN BLDG., WASHINGTON, D. C.
 Designers of the AIRTRACK RADIO SAFE LANDING SYSTEM

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WIT McLachlen Bldg., Washington
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 FREE ILLUSTRATED FOLDER
 Information on MODEL FLIERS' Club.

Name _____ Age _____
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SAY FELLOWS
HERE'S YOUR
CHANCE TO
PUT THAT
1ST PLACE
MONEY IN
YOUR POCKET
- NO OTHER
SHIP CAN
CATCH THE
SPOOK!



1/5 H.P. complete with coil and condenser, \$6.95



SPEED CHIEF
ALL ALUMINUM RACING CAR
COMPLETE KIT \$12.50
(LESS MOTOR)



CAST ALUMINUM EXHAUST STACK
FITS ALL
BROWNS AND MIGHTY MIDGETS
Lite Weight Length 3 1/2"
\$1.00

SMITH COILS



\$2.50

VALVOLINE OIL SAE 70



10c

AUSTIN



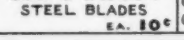
\$1.25

OHLSOHN "23"



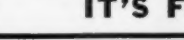
.50c

Free-Wheeling Sets



EA. 10c (E. SIZES)

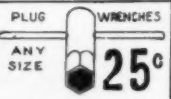
STEEL CONNECTING RODS FOR BROWNS



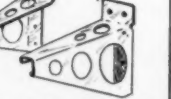
EA. 10c



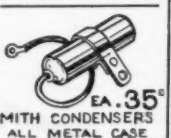
BATTERY BOXES
PENLITE 40c
MEDIUM 40c
LARGE 50c



ANY SIZE 25c



STAINLESS STEEL MOTOR MOUNTS
LENGTH 3 1/2" \$1.00 pr.



EA. 35c
SMITH CONDENSERS
ALL METAL CASE



VOIGT AIR WHEELS
Inflatable
2 1/2" Non-Inflatable 1.00
2 1/2" Inflatable 1.25
3 1/2" " 1.50
4 1/2" " 1.75
1 1/2" TAIL WHEEL .15

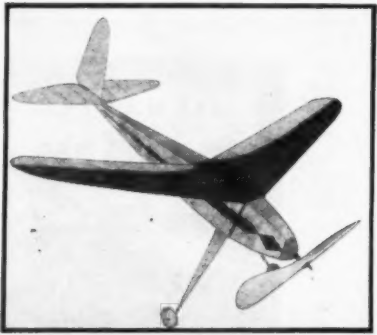


BURGESS BATTERIES
CLASS "A" 3/4 oz. .25
CLASS "B" 2 oz. .50
CLASS "C" 4 oz. .70

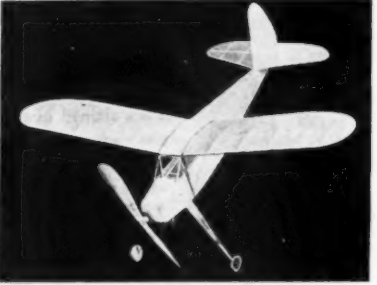
WRITE FOR OUR NEW 1940 MODEL CRAFT CATALOG IT'S FREE!



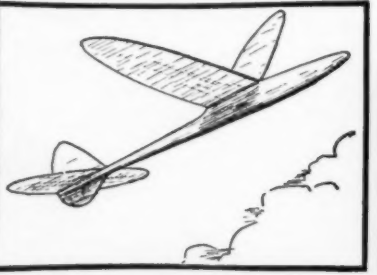
THE ALBATROSS 45 in.
Towline soaring glider. Here is the large glider you have been asking for. Kit is complete. Add 10c for postage. 50c



RECORD WRECKER
Newest Modelcraft Sensation! With a 26" span the Record Wrecker includes free wheeling unit, rubber lube, contest rubber, best quality balsa, cement, dope and large full size plans. Add 10c for postage. 50c



CLOUD HUNTER
40 in. model, same ship as Pacific Ace, add 10c postage 50c
W. R. Butterfield of Los Angeles made a flight of 2 hours and 40 min. with his Cloud Hunter.



CLASS "B" ALL-BALSA GLIDER
Class "B" all-balsa Glider is easy to build and a honey to fly. Add 10c postage. 25c



MODEL CRAFT SOARING GLIDER
(Towline Glider)
31 1/2" Soaring Glider has turned in flights of better than one hour. Kit complete. Add 10c Postage.



30 in. PACIFIC ACE
A practical and durable commercial model. Constructed from well drawn and detailed plans. Kit contains an ample supply of first grade wood and high quality cement. Comparable with and flies most dollar kits. Add 10c for Postage.



THE CHAMP
Wing Area 191 sq. in.
The name Champ tells the story. It will fly any model in its class. The kit is complete, nothing else necessary to build the model. Includes free wheeling unit, plane of rubber, rubber lube and the best dope you've ever seen. Add 10c for postage. 50c

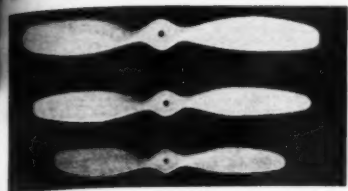


SUPER HIGH WING 30 in.
A companion model to the Pacific Ace. As sweet a flying ship. Kit is complete. Add 10c for postage.

★ ★ **M O D E L** ★ ★
THE LEADING SUPPLY HOUSE OF THE WEST

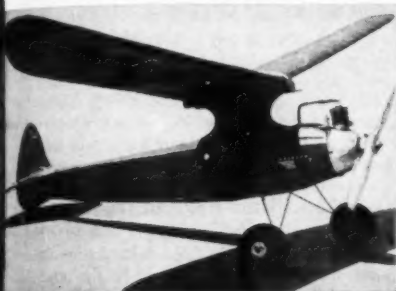
LOOK!

GAS MODEL PROPS



made from straight grain hard wood. D-G have shown from 20 to 30% more thrust in every other prop. The most convincing test put one on your ship and see it climb faster than it ever climbed before. Sold by all dealers and distributors who want to give you the best. Complete range of sizes, 10" 11" 12" 13" 13 1/2" 14"

25c

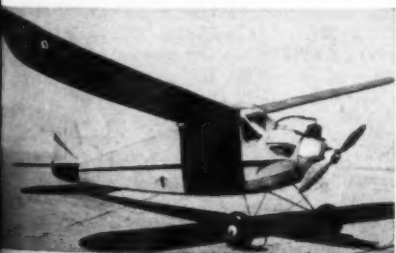


INTERCEPTOR—CLASS "B"

World's fastest climbing model. Engine for engine, this ship will grab nearly twice as much altitude with same engine run. Power with, Ohlsson 23, Ohlsson Brown Brownie, Bantam, HiSpeed Bullet or Torpedo, similar engines. Wing span 46" chord 7". Kit contains cement, dope, covering, all printed parts, bent landing gears, turned aluminum cowl, and Model Airwheels. Price.....

\$2.95

POSTPAID 25c

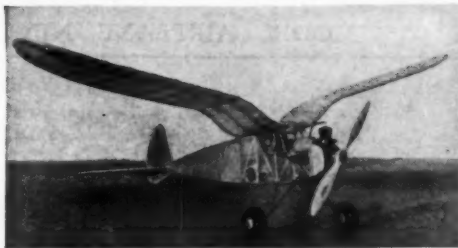


SKY BABY—CLASS "B"

Designed for Class "B" engine such as Ohlsson 23, Torpedo, Junior Motors Brownie, this model in its test flights did 15 minutes on a 12 second engine run. Has won many firsts, including the recent Fresno contest. Wing span 54", chord 7". Kit complete with cement, dope, covering, formed landing gear, air wheels, spun aluminum cowl, etc.....

\$3.85

25c



SPOOK—CLASS "A"

Class "B" Performance in a Class "A" Ship

Specifications: Flying weight with Ohlsson "19", 18 oz. Wing loading 8 oz. to the square foot. Span 48". Can be flown as Class "B" with Ohlsson "23" or Hi-Speed. Kit complete with cement, dope, covering and wheels.....

\$1.50



MISS TINY—CLASS "A"

May now be flown in two classes. After winning many places in Class "B," including second in the 1939 National Meet, Tiny may now be powered with Ohlsson 19, Bantam, Madewell Mite and other such engines for Class "A." Watch the Tins take another string of firsts, seconds and thirds in 1940, and watch the present Class "A" records fall to Miss Tiny's superior performance. Get a Tiny and start collecting first place hardware for yourself.

Wing span, 46". DeLuxe Kit contains spun cowl, silk, 2 1/2" Voit Air Wheels, cement, dope, die-cut ribs, plenty of good balsa, and full size plans.

\$3.95

Price.....
STANDARD KIT same, but with bamboo paper covering.....
DRY KIT complete except for wheels, covering, cement and dope.....
PLANS ONLY.....

\$2.95

\$1.95

25c



PACIFIC ACE—CLASS "C"

66 in. tapered wing. DE LUXE KIT contains tapered spars, beveled and tapered trailing edge, die-cut ribs, turned aluminum cowl, 1 qt. gas dope, 1 pt. cement, 3 1/2 yds. super silk, formed landing gear, 4 1/2 in. inflatable air wheels, dural wire, alum. tube, washers, bolts, haskalite, dural sheet, hook up wire, switch, selected hard balsa, full sized, black and white, plans with test flight instructions, complete.....

\$8.50

STANDARD KIT with bamboo paper, 1/2 pt. of dope, 1 pt. of cement and 3 1/2 in. air wheels.....
DRY KIT same as above without cement, dope, silk or wheels.....
PLANS ONLY.....

\$6.25

\$4.75

50c

MODEL CRAFT MOTORS

BROWN Class "C"



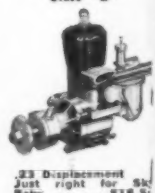
Model "D" \$12.50
Model "C" \$18.50
Model "B" \$21.50
Model "M" \$16.50
Post Paid

OHLSOON "19" Class "A"



1.9 Displacement
Just right for Tiny.....

OHLSOON "23" Class "B"



.23 Displacement
Just right for Sky Baby.....

OHLSOON "60" Class "C"



.60 Displacement
For your Pacific Ace.....

JUNIOR MOTORS BROWNIE Class "B"



.29 Displacement
Orders will be filled in rotation as soon as deliveries start.



TORPEDO Class "B"

Displacement .30 cu. in. 1/5 H.P. 8,000 r.p.m. with 1/2 in. prop.....
Post Paid

HI-SPEED Class "B"



1/7 H.P. 6500 R.P.M.
Weight bare 3 1/2 oz.
Runs upright or inverted; fully assembled, complete with coil and condenser.
\$12.75 POSTPAID

ATOM Class "A"



Bore 1 1/2" - Stroke 1 1/2"
Weight 2 oz. \$12.95

Sky Chief Class "C"

Displacement .536, 1 1/2 H.P., Base 7/8", Stroke 7/8", weight 10 oz. with condenser and coil, \$6. Postpaid



SPEED KING

Gas Model Racing Car. Sleek, powerful looking, cast frame, transverse springs, oilite bearings, special racing wheels, kit.....

\$15.00

MODEL CRAFT

7306 SO. VERMONT AVE., LOS ANGELES, CALIF.



When Bud Warren takes off he gets altitude in a hurry. Proves there is real power at his finger tips.

BUD WARREN SAYS:

"It's a snappy take off and rapid climb that makes model flying the fun it is now-days. When I go out to the flying field I expect and get pursuit job performance."

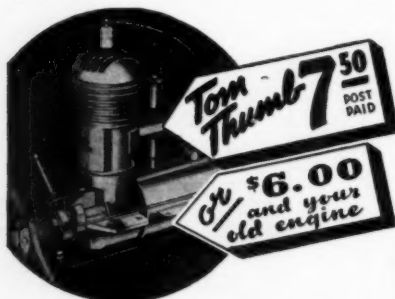
"They can argue about proper airplane design but when the wheels leave the ground and until the timer cuts it's engine performance that counts."

"Tom Thumb owners know the thrill of this kind of flying. They write to say the Tom Thumb is no ordinary engine. Many are amazed to find the Tom Thumb gives performance they were led to expect only from a high priced engine."

"With the Tom Thumb it's not the cost that counts. I block test and run in every motor at peak speed and make sure each Tom Thumb earns me a new friend."

SPECIFICATIONS and HOW to BUY the NEW TOM THUMB

The Tom Thumb is the most powerful easy starting 1/5 H.P. engine made. Clip the coupon below, enclose money order for \$7.50 (also your old motor for special \$6.00 offer), and receive a brand new assembled and block tested Tom Thumb. Complete with fuel tank, coil, Champion spark plug, one piece cylinder and head and other modern features. Complete flying weight 10 oz. (less batteries). Bore 3/8"; Stroke 3/8".



WARREN SALES & SERVICE
412 Brett St. Inglewood, Calif.

☐ Rush me one new Tom Thumb Engine. I enclose \$7.50.

☐ Rush me one new Tom Thumb Engine. I enclose \$6.00 and my old engine (any make) including all parts regardless of condition.

I intend to run my Tom Thumb—
☐ Upright ☐ Inverted

Name

Street

City..... State.....

celler, etc. and cement the windshield in place. The addition of the usual French insignia, control surface outlines, exhausts, etc., is really worth the time and effort consumed, for these minor details really "make the model." The wing cocardes and the rudder stripes can easily be made from colored tissue, or they can be painted on with colored dope. Thin strips of black tissue effectively represent the control surfaces—some builders prefer to mark the surfaces with a ruling pen filled with India ink. Exhaust ports, wheel wells and other details are represented by black paper.

Depending on the finished weight of your "Cyclone," a six or eight-strand rubber motor will be needed. Attach the strands to the prop shaft and drop the other end through the fuselage with the aid of a weighted string. As indicated, a round bamboo pin holds the motor in the back.

Flying

Probably the most important single factor in obtaining fine flights from any flying scale model is patience. A well-built model, if properly handled, will provide numerous realistic flights with little or no damage to the model itself. It is important that the models glide is reasonably good before any power flights are attempted; select tall, soft grass for these tests to prevent any damage. In all probability your "Cyclone" will glide rather smoothly, but a bit of weight in the nose may be needed to correct a tendency to stall. Try a few power turns once the glide is okay; minor adjustments may be made by slightly warping a wing tip or the stabilizer, as the case may be, but correction of serious misadjustments should be made at the nose plug. Right or left thrust will control the size of circle while under power and slight down-thrust will iron out a stall—low-wing models seldom need the latter adjustment, however. A mechanical winder is used for maximum flight performance. Our test model proved to be a speedy flyer and it was adjusted to fly in large left circles. Here's wishing you a lot of success.

N.A.A.

(Continued from page 29)

more stress upon the scientific principles underlying Theory of Flight, Meteorology, Navigation and Airplane Design.

Once over lightly department: Congratulations to the Linden Model Aircraft Club on the observance of their fourth anniversary. The occasion was celebrated by club members at a party given at the Old City Hall in Linden, N.J. Their club sheet, the LMCA "Gazette" has been doing very well, due in part, probably, to the fact that they have several writers on the job (local papers please note) . . . Ever hear of "Safari On Wheels?" It's a sound picture offered by Esso marketers booking-agents at no charge to clubs and similar organizations. They furnish the sound film, the operator, the screen and equipment; you furnish the audience. This half-hour talking picture of Africa should be of interest to your club, and would probably result in a big turnout (contains no advertising). For full information and an application postcard, write to G. R. Taylor & Company, 1000 Springfield Avenue, Irvington, N.J. . . . The Akron Women's Chapter is planning big things

for Akron modelers this year. Mrs. Lois H. McDowell, President of the chapter, writes in to say that organized activities will be used this year to finance such projects as furnishing a university scholarship to a modeler displaying outstanding ability in aeronautical subjects, sponsoring model meets, providing a workshop for model builders and helping to support the National Youth Administration aviation mechanics school . . . F. J. Highberg, Secretary of the Exchange Club of Denver Model Chapter, says that they want more competition for the Webber-Bennett Traveling Trophy. Briefly, the trophy is contested for by clubs not less than 300 miles apart, under N.A.A. Academy rules, forwarding expenses to be paid by the losing club. It was the wish of the donors, Contest Directors R. L. Webber of Chicago, Illinois and H. W. Bennett of Denver, Colorado, that the trophy should enjoy nation-wide competition. Already it has "been around" quite a bit. Every N.A.A. Academy Model Chapter is eligible to compete, and if you win, you don't have to pay the freight! Are you going to let them get away with that crack about no competition? Write a nice huffy letter to Mr. Highberg, 2951 Williams Street, Denver, Colorado, no matter where you are, and tell him your gang will take him on any time, anywhere, rain or shine!

Gas Model Insurance "In the Works"

The long-awaited gas model insurance is at last a reality. The only delay before the program gets under way will be the printing and distributing of the official insurance application forms and "certificates of insurance."

Although the final verbiage of the policies is to be determined, the insurance agreed upon and shortly to be available will be as follows:

For a premium of \$1.00 a year, N.A.A. Academy Model Division members holding a gas flyer's license can secure, under a master policy held by N.A.A., \$25.00 FIRE INSURANCE, excluding fire caused by self-ignition. The policy will cover only fire damage caused by flames originating in the building in which the model is contained.

DAMAGE CAUSED BY TRANSPORTATION is to be covered, when such loss is caused by the stranding, sinking, overturning or collision of a vehicle in which the model is being transported. Transportation by bicycle or motorcycle is not covered, nor is any coverage afforded unless the model is in the possession of the licensed member.

This fire and transportation insurance applies to one model only. In other words, if a model flyer has two models and both are burned or damaged in a transportation accident, there is only \$25.00 insurance applicable. Further, after a loss has been paid under the fire and transportation section, the insurance is used up.

There has been arranged PUBLIC LIABILITY insurance subject to a limit of \$500.00 for any one accident. This does not cover liability for injuries to the member to whom the insurance is issued, his parents or guardians.

Further, PROPERTY DAMAGE LIABILITY insurance is provided subject to a limit of \$500.00 for any one accident. This does not cover damage to property

Question:

AROUND WHAT LINE OF MOTORS DID
THE LEADING KIT MAKERS* DESIGN
THEIR FASTER-CLIMBING 1940 KITS?

Answer:

THESE POWER-PACKED **OHLSSONS**

★ **Berkeley, Cleveland, Comet, Megow,
Modelcraft, Scientific, and many others.**

"MATCHED ENGINEERING"

*Latest and Most Logical Development
in Gas Model Competition!*



**IT'S AN
OHLSSON
MATCHED JOB**

A kit maker wrote (a month before this ad is appearing): "Your new 60 Custom had so much power it looped our Class 'C' job, but in spite of this we took Second Place. Give us a couple more weeks and we'll really have a WINNING COMBINATION."

Did you ever ask yourself what motor your kit was designed for? Not only what motor had the most "power" in each class, but what motor best fitted the design of your particular model?

Here is an important development for model builders everywhere. With the field to choose from, the leading kit makers and many others have designed their 1940 kits around Ohlsson micro-engineering.

Naturally these kit makers are interested in seeing their models go—just as interested as you are. They used these three Ohlssons in designing their new kits because they learned last year that Ohlsson engineering is a step—or maybe a

jump—ahead, giving them the climbing ability a model must have, and allowing their designers to work out the new experiments in aerodynamics which keep model building a progressive science.

This means you can now get fully matched engineering—a motor that will bring out the best features of your model—and kits designed to handle the power of their motors! See the new 1940 Ohlssons at your authorized dealer today—and pick one of the 1940 kits to go with it!



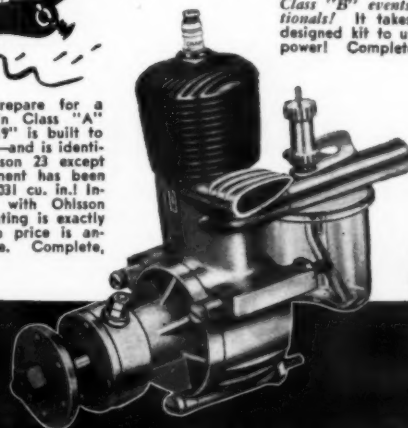
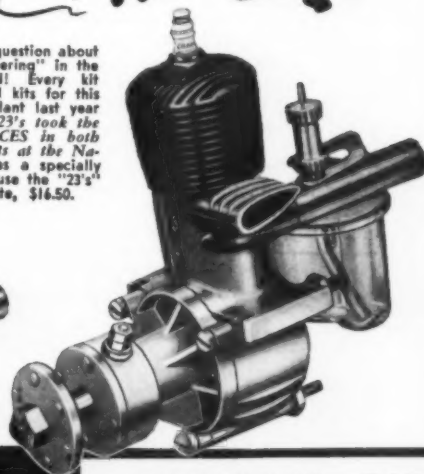
Ohlsson 19—Prepare for a real "sock" in Class "A" power! The "19" is built to the limit—199—and is identical with Ohlsson 23 except that displacement has been reduced just .031 cu. in. Interchangeable with Ohlsson "23", as mounting is exactly the same. The price is another surprise. Complete, only \$14.50.



Ohlsson 60 Custom Not only Class "C" climbing performance for 6 and 7 foot Class "C" ships, but performance superior to anything you have seen with kits designed to handle 60 Custom surging power. Available for inverted upright running at extra charge. Complete, \$21.50.



Ohlsson 23—No question about "matched engineering" in the Class "B" field! Every kit maker advertised kits for this famous power plant last year—and Ohlsson 23's took the FIRST 10 PLACES in both Class "B" events at the Nationals! It takes a specially designed kit to use the "23's" power! Complete, \$16.50.



THE WINNER'S CIRCLE

MAX WASSAM
New Philadelphia, Ohio
First Place—Class "B"
1939 Nationals
OHLSSON 23

the **MOTORS** the **NEW KITS** were **BUILT FOR**

The New Ohlssons Designed to Conform to 1940 N.A.A. Rules

OHLSSON and RICE
MANUFACTURING COMPANY
Ohlsson Miniatures

P. O. BOX 1018 ARCADE ANNEX
3340 Emery St., Los Angeles

Pursuit-Aire "45"

\$195 KIT

 COMPLETE
LESS
WHEELS,
MOTOR

 CLASS "A"
POWERED BY
1940

BANTAM

 NEW
1940

CHAMPION
SWEEPING THE
MODEL WORLD

 CLASS "B"
POWERED BY
OHLSSEN
"23"

CLASS "A & B DUAL PURPOSE PLANE"

SELECTED BY "BEN SHERESHAU" TO TEST FLIGHT 1940 BANTAM

Featuring ★

New simplified crutch construction ★ Finest model building plans yet produced with complete wing layout and 12 step by step Geometric drawings ★ Shock proof motor bearers ★ Booklet with building and flying instructions by M. Bryceland well known Model expert and designer ★ Gull wing design to complete the finest contest and sport model yet offered to the Model World.

DEALERS-JOBBER WRITE IN

MODEL DEVELOPMENTS, INC., 26-28 Clark St., Glen Ridge, N. J.

KIT 100% COMPLETE

Including large full size plans with explicit details and instructions, highest quality strip and sheet Balsa, printed wood details clear and true, finest spring steel wire, selected AA colored tissue, all necessary hardware, 4 oz. Cement and 4 oz. Clear Dope.

owned, leased or controlled by the gas model flyer, his parents or guardians, who are named as insureds under the policy.

The insurance protection, embracing as it does fire and transportation protection, property and public liability, is adequate and will be provided at a most nominal fee (\$1.00 per year). It is not the desire of N.A.A., or the insurance company's intent, to secure coverage for a loss caused by carelessness or exhibitionism on the part of any licensed flyers.

Contest directors and club officials will be notified as soon as the insurance applications are available. *No requests should be sent to headquarters until such an announcement has been made.*

Frontiers

(Continued from page 17)

want a better idea as to their size compare the Boeing B-17's 38,000 pounds with the 70,000 pound mark!

The design problems on one of these "flying fortresses" are certainly complex. The sleek smooth lines of our new fighting planes hides the details of design within. The hydraulic system alone is a major item in the design of an airplane today, and in one of these new Douglasses or Boeings is a maze of plumbing carrying

oil under pressure to the individual cylinders that operate the flaps, landing gear, tail wheels, brakes, bomb doors, bomb racks and engineers have even worked out systems for the operation of control surfaces and such smaller items as trim tabs and cowl cooling flaps.

A large tank is carried in the airplane, readily accessible to the service crew, for carrying the hydraulic fluid. Lines run from the tank to an engine-driven pump that supplies the needed pressure. It takes a considerable amount to lift those huge landing gears. Usually a hand-operated pump is also provided in case the engine-driven pump fails. The oil is then routed to selector valves to which are attached control levers for "selecting" operation of the flaps, landing gear, etc.

Dials are provided showing the oil pressure in the lines and of course automatic safety relief valves must be provided throughout the system in case the pressure should be dangerously increased because of a jammed control surface or other hydraulically operated mechanism. These safety valves must also be located in a part of the airplane where they may be adjusted and inspected readily by the ground crew at regular inspection periods. The lines must be so situated to provide gravity drainage with drain cocks at their

ends so they may be drained and cleaned when necessary.

One-way valves must be included to regulate the direction of flow of the fluid and sometimes by-pass valves are employed in emergencies to provide a cross-flow to relieve pressure in operating cylinders and permit the landing gear to drop to the down position by its own weight if malfunction occurs in the hydraulic system.

The engineer must also consider the strength and the weight of the system, the design of the fittings and parts for practicable manufacture and their access to repair. Then he must consider position indicators to be installed in the cockpits to show the position of the landing gear, flaps, bomb doors etc. at all times. These usually consist of a series of cables and pulleys, or they are a part of the electrical system. When the pilot is coming in for a landing a red light is usually provided to warn if his landing gear is not down. Other warning devices used are horns and vibrators attached to the rudder pedals. Then there must be locks to consider, usually another part of the electrical system, for holding the landing gear in the up and down position.

The above are just a few of the items that an aircraft company engineering department has to consider besides the actual performance of the airplane. The aerodynamicist, the stress analyst and the engineers in charge of radio instruments, hydraulics, powerplant, armament and weights all play their part in the evolution of an aircraft design. When one of these multi-engined warplanes is completed their "organisms" function in clock-work precision and it is fascinating to realize that they can take off into the air and fly for thousands of miles at super speeds. We hear that Consolidated's (B-24) fast, high-mid-wing creation will do 365 m.p.h. top and 325 m.p.h. cruising which is well above Boeing's B-17 "flying fortresses"! Consolidated also has another multi-engined bomber on the fire which will probably go to the U. S. Army Air Corps.

At DuBois, Pennsylvania, Captain R.H. Martin has finally begun construction of his aircraft factory that is destined to manufacture DuBois-Martin military airplanes. This company is not just another sudden spurt to capture some of the war business now floating about the United States, as Captain Martin has been organizing the company for the past year. The first product, presumably called the "Thunderbolt," will be of the multi-engined fighter type and appears to be what is needed in that war over there in Europe. It has all of seventeen guns on board, and the enemy will certainly know when it has arrived.

The navy has been doing big things lately in the bomber line also. They recently called for bids on giant patrol bombers powered by four or more engines . . . and Consolidated was the lucky winner with a \$20,000,000 order! That company looks as though it will be tops in the flyingboat market for a long while. Right now their new XPBY-5A amphibian is going through its test paces at Anacostia. Powered by Twin Wasps and with a wingspread of 104 feet, length 65

M & M MOTORS AND WHEELS

TRIED—TESTED & PROVEN THE BEST

All M & M Wheels can be inflated & deflated

 Our 3/4" and 2 1/2" Gas Wheels are the
Lightest and Best Wheels Made


All M & M wheels can be inflated and deflated

M & M 3/4" Gas Wheels \$1.50 P.P. For Air Mail Add 21c

 Dealer: Our new discounts are very attractive. Builders—Send for free illustrated literature.
M & M's New 2 1/2" WHEEL Designed for SMALL GAS MODELS ONLY \$0.90. For Air Mail add 17c. 3 1/2" & 4 1/2" Gas wheels—Now only \$2.75 per pair, postpaid.

M&M MODEL WHEEL CO. SEATTLE, WASHINGTON, U.S.A.

 M & M's For Larger Gas Models
Size 6"x17/8". Price \$4.50
per pair P.P.

 M & M Super Heavy Duty
Wheel for Rubber Powered
Models.
SIZES 1 1/4"—1 3/8"—1 1/2"—
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 SIZES 1 7/8"—2"—2 1/4"—2 1/2"—
2 3/4"—2 7/8"—and Special
Designed DoNut Wheels.
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Introducing **BROWNIE-**

**the toughest
little guy
in the
WORLD!**



BROWNIE—MODEL E

You've been waiting to meet this newest member of the Brown Junior Motors family—a great little guy at a price that *everyone* can afford... And here he is!

Brownie has been designed, after long and careful research, to meet the increasing demand for a guaranteed motor of top quality in the "B" class. Costing only \$7.50, Brownie is the most powerful motor in the "B" class—with a cubic inch displacement of .29 out of a possible .30 as specified in the NAA rules for class "B" competition. May be inverted. Equipped with the Champion V2 plug.

Brownie is a complete take-off on the present line of Brown Junior motors and presents a new phase in engineering design. This little giant is a revelation of the possibilities of a model motor

at a low price. Brownie could not have been produced if it did not come from a family of famous motors... made possible *only* by the world's largest, most completely equipped model motor plant.

In making your plans for the open season be sure to include Brownie. Full specifications may be obtained from your nearest dealer. Or write us, and we will give you complete details.

There is a record-breaking Brown Junior Motor in every price class for 1940. Model B for \$21.50 is the finest model motor ever built. There is Model C for \$18.50 and Model D for \$12.50. Model M is the famous race car and marine engine for \$16.50. See your local dealer or department store for further details on this famous line of championship motors.

PRODUCT OF THE JUNIOR MOTORS CORPORATION

**Brown
JUNIOR
MOTORS**

SIMPLY PASTE THIS COUPON ON BACK OF A PENNY POSTCARD.



JUNIOR MOTORS CORP., 2549 N. BROAD ST., PHILA., PA.

I want to know more about the new Brownie (Model E) motor.

Name

Address

City and State

Be Ahead of the Rest by Building the

★ Class "A" Gas Models ★

\$1 GAS MODELS



Both may also be flown by Rubber Power with Sound Device. You Get Your Motor

BABY PLAYBOY!

Class A Design, 33" span, 8 oz. (with motor) 144 square inches of area. Kit GP-5005 includes everything (except power unit) only..... **\$1.00**



"ITSY-BITSY"

Sensational New Monowheel Gas Job

With its parasol arrangement of polyhedral wing and monowheel landing gear, this "I-B" marks a new and radical departure from orthodox model aircraft design. We believe it will prove the forerunner of many such models for both pleasure and contest flying. Power it with a 1/2" bore motor. Kit comes with full size drawings, printed out wood parts, very well detailed cut to size wood strips, colored tissue, wood and tissue cement, etc.—everything as found in our standard gas model Kits. Complete Kit GP-5016 (except power unit) only **\$1.00**

C-D'S "THERMALIER"

A perfect Class C stick model with a polyhedral wing. Span 36", length 28", weight 4 1/4 oz. It also has a rocket climb and a smooth flat sailplane glide. Kit complete except for rubber (so that you may always use fresh rubber) **50c**
Kit E-5014.....



★ Class "B" Gas Models ★

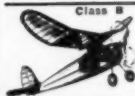
PLAYBOY, JR.

Finest of its type, yet no harder to make than a "Wakefield" model. A perfect "step-up" design to serious gas model work, yet one which will give a better-than-average chance of winning contests for both beginners and "old timers" alike. Color, yellow and black. Span 48". Complete Kit GP-5006 includes everything necessary (except power unit) only..... **\$2.50**



CLEVELAND CLOUDSTER Very Popular

A 50" gas model complete with full size drawing, printed ribs, shaped leading edge, cut strip wood, colored covering paper, wood and paper cements, balsa wheels, formed landing gear, etc. Complete Kit (except power unit) GP-5004. Only..... **\$2.50**



CLEVELAND "CHAMPION" (Designed by Korda)

Span 48". 23 oz. complete. Beautiful flyer. Complete Kit GP-5005 includes everything (except power unit)..... **\$2.95**

CLEVELAND FLEETSTER Pace Setter in Looks & Performance

Sister ship of our popular Cloudster. Advanced type Class "B" monoplane. Special wing design, together with highly streamlined fuselage and lifting tail, makes this an excellent contest model. Yellow and blue trimmings. No prettier commercial type gas model ever developed. Span 42 1/2". Complete Kit GP-5007 (except power unit). Only..... **\$2.50**



WE MAKE ALL TYPES

Everything listed in our catalog. This 20" Outdoor Class B Glider "Javelin" 25c. Indoor B "Arrow" 25c. Indoor A 25c. A Class micro-film ROG 25c. Many others!

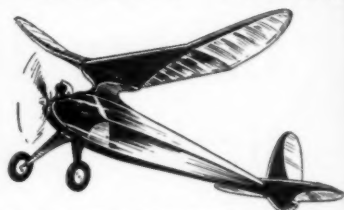
CLEVELAND WAKEFIELD GULL

Span 45", terrific climb and a sailplane glide. Keep your eye on this model in future contests. Eligible in Moffet, Stout, etc., contests. Kit complete except rubber (so that you may always use fresh rubber). Kit E-5015..... **\$1**

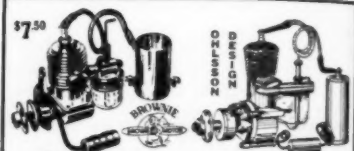


★ Class "C" Gas Models ★

First Showing of the New PLAYBOY SENIOR



Such instant popularity has followed the introduction of Playboy Jr. and Baby Playboy, that we now offer the same popular design (with necessary modifications because of larger size) in conformity with the new N.A.A. Class "C" stipulations. Playboy Sr. is, we believe, the first model so designed. Design may also be converted into nest cabin job. Kit, except for power unit, is absolutely complete with everything necessary, including full size drawing, printed out wood parts, plywood for fire wall, cut to size wood strips, colored tissue, wood and tissue cements, dural motor mount, formed landing gear and streamlined wheels, nuts, bolts, etc. Complete Kit GP-5017 (except power unit)..... **\$3.95**



Send Your Order NOW for One of These Popular CONTEST MOTORS

For CLASS A
Mighty Atom.....\$12.50
New Ohlsson "19" 14.50

For CLASS B
Ohlsson "22".....\$16.50
The new "Brownie" \$7.50

For CLASS C
Sky Chief.....\$ 6.95
Brown, Jr. Model D.....12.50
Brown, Jr. Model C.....14.50
Brown, Jr. Model B.....21.50
Dennymite Standard.....15.85
Dennymite DeLuxe.....17.85
Ohlsson "Custom 60".....21.50



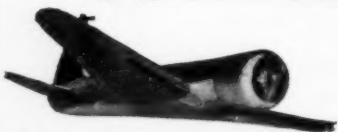
Microdyne
Mighty Atom is
the motor for
"Baby" Play-
boy and "Iisy-
Bitsy."

C-D Popularly Priced "REP" Model

Cleveland "REP" Kits are all 20" Wing Span except the REP 5001 which is 28". Kits contain full sized detailed mechanical drawing, all wood printed out, finished scale wood wheels, turned cowl or drilled nose, finished balsa prop, strip balsa cut to size, covering tissue, printed insignia and wing lettering cement, etc.



England's Phantom Fairy "Battle"
20" Span (Formerly, 50c), Kit R-67,
now only.....25c



20" Hughes' World Record Racer. Kit R-54, 50c



20" Al. Williams Grumman "Gulphawk". Kit R-70, 50c



20" Grumman F2F-1 Fighter. Kit R-53, 25c



20" Fully retractable landing gear.
Kit R-59, only 25c

Read Before Ordering

See Your Dealer First. If he can't supply you send check or money order—cash at your own risk. Include 15c for packing charge and postage under \$1.50. C.O.D.'s accepted only when \$2.00 deposit accompanies order to insure acceptance of delivery. Shipments outside U. S. add 10c—For P.P. Special Delivery in U. S. add 25c. (Ohio Residents add 3% sales tax). "Same Day Service"

CLEVELAND MODEL
4508D27 LORAIN AVENUE

Best . . . CLEVELAND AIR, TRAIN, RACE CAR MODELS

Again C-D is First with the Latest!

CLEVELAND AIRCAR

(Propeller-Driven Gas Racing Car)

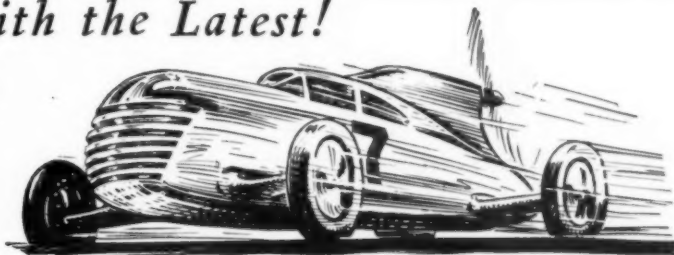
The surprise of the year! Think of a complete Racing Car with everything needed (except power unit) for less than a five dollar bill. And it's extremely simple to build, too.

Gas Airplane Modelers Will Go for This!

While designed and built like the usual racing car, the construction of the Cleveland Aircar may be likened more to a gas powered airplane, since it is so easy to make. All you need is—a knife, and paper, screw driver, pliers, and brush for painting.

All the Thrill of Expensive Race Cars

Here's all the thrill-packed enjoyment of making a model racing car—without paying the many times higher price of the gas driven car. And a car like this, driven by a propeller, brings the satisfying simplicity most model airplane builders love. You can power the Cleveland Aircar with most any kind of engine of small bore—although we predict the greatest number of them will be powered with $\frac{1}{8}$ " bore engines.



You May Alter the Aircar Design

The design of the Cleveland Aircar, as the two sketches indicate, may be altered several different ways to suit the individual builder. Simply change the curve of the body and motor mount, which can be mounted as high or low as you wish, to suit the engine and propeller needed.

Traction need not be worried about, for it may easily be adjusted by the motor mounts on a downward angle (forward), but even while bounding or flying, there is really no traction to worry about since the propeller keeps the Aircar going at the same rate of speed.

Kit AU-7 for the Cleveland Aircar is absolutely complete with rubber-tired wheels (except for power unit and color) including cable hooks for hooking on to your cable ready to operate.

AND IT'S ONLY \$4.50

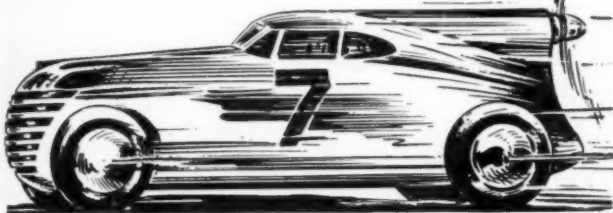
Other RACE CAR Models

20" Speed Demon, friction drive, all metal parts finished	\$16.50
"Rocket" front wheel steering, front wheel drive	19.00
Mercury Midget, all cast aluminum rear wheel drive	23.50
Alexander C.A.R., all cast aluminum, easy to assemble, front wheel drive	25.00
ALL ABOVE KITS WITHOUT MOTOR	
Complete Speedway Motor	\$14.00
Dennymite Motor	17.95



Build Tiny Scale Models

Six Winners—3 Indianapolis, 3 European. All 6 Kits, 60c plus 15c postage.



Build the Fastest-Growing Model RR System in the World—C-D "ALL-AMERICAN" GAGE

Don't be sorry later you didn't start in this gage now. All "REP" kits below are $\frac{3}{16}$ " scale for $\frac{1}{8}$ " C-D gage and are dry (no liquids). Average over all sizes—Locomotives, 12"-17"; Box Cars, 8"; height 2 1/2". Kits are complete with sides, tops and ends printed in authentic colors and lettering. All "REP" (cars only) models may be used in your operating layout later. We also make at \$1.25 per kit any of the freight cars to operate.



RL-1 PRR Switcher Loco .50	CABOOSE
RL-2 C&O Pacific 4-62 .50	RC-1 PRR type N-5 .10
BOX CARS	FLAT CARS
RB-1 NYC—40 ft. steel .10	RF-1 C&NW 46' 50 ton .10
RB-2 B&O—40 ft. steel .10	RF-2 PRR 46' 50 ton .10
RB-3 B&O—40 ft. wood .10	RF-3 B&M 46' 55 ton .10
RB-4 Rock Is. 40' wood .10	RF-4 L&N 46' 50 ton .10
RB-5 B&A—40' wood .10	GONDOLA CARS
RB-6 SP 40' wood furn. .10	RG-1 L&N 41' 35 ton .10
RB-7 T&P 40' wood auto .10	RG-2 NYC 41' 50 ton .10
RB-8 AT&SF 40' wood .10	RG-3 MC 41' 55 ton .10
	RG-4 T&P 41' 55 ton .10
HOPPER CARS	8000 GAL TANK CARS
RH-1 C&O&L RR .10	RT-1 Texaco—TCN (wh.) .10
RH-2 Missouri Pac. RR .10	RT-2 NATX (wh.) .10
RH-3 Southern Railroad .10	RT-3 Sinclair—SDRY .10
RH-4 Illinois Central RR .10	RT-4 Gulf—CROX (oil) .10



C-O-C G. W. 4-6-0 Loco. Complete Operating model kit (less motor) \$9.75. It's a mixed traffic loco-pass. or fr.

P. R. R. 0-6-0 Switcher. Complete Operating model kit 50c. Operating model C-D Kit (less motor) \$8.75.

Either AC or DC motor for operating models, ea. \$3.75

Famous C-D $\frac{3}{4}$ " Models

Scale Flying SF Model Kits are, as the name implies, $\frac{3}{4}$ " to the foot authentic scale models of famous ships. All are now available in C-D COMPLETE (WET) KITS. They contain all parts including cements and dopes necessary in building these world famous model airplanes. All shown on catalog 95c to \$2.50.

Build These U. S. War Planes



SEVERSKY P-35 FIGHTER

Complete Kit SF-61 (Span 24") \$2.25
Complete Dry Kit D-61 (Span 16") 85c

Popular C-D $\frac{1}{2}$ " Dwarfs

Dwarf kits are for authentic $\frac{1}{2}$ " scale models identical to the famed SF line except they contain everything necessary to complete building but colors. They now contain a tube of cement. All shown in catalog 25c to \$2.50.



MILLIONS OF MODEL MAKERS

STRIKE IT RICH. EVERY C-D KIT IS A GOLD MINE OF MATERIAL.

Build These Realistic

C-D SCALE GAS MODELS



STINSON RELIANT

Great for Radio Control

82" span. For $\frac{1}{8}$ " bore or larger engine. Complete Kit GP-66, includes everything (except power unit) only \$11.95

REARWIN SPEEDSTER

64 1/2" span. For Ohlsson "20" or larger motors. Complete Kit GP-60, includes everything (except power unit) only \$7.50

As space here is too limited to show more than just a very small part of the C-D line

Send for New No. 30 Catalog

Get your Copy Now! Contains 5 great lines of C-D airplanes, race cars, variety of ship kits and fittings, model railroad equipment and toy trains, 10c up in C-D and HO gage; a wide variety of gas model airplanes and all well-known makes of gas engines; gas and "rubber driven" supplies; also "general" supplies for railroad and innumerable model uses; hand tools, etc. Nearly everything a real model builder could wish for within its pages for only one thin dime. Send for it today! (NO FREE COPIES.) Only 10c

& SUPPLY CO., INC.
CLEVELAND, OHIO, U. S. A.

DEALERS! 1940 is going to be a record-breaking year in model building. Cash in on it big—with America's most wanted model Kits. Priced to fit all purses—designed to satisfy all tastes. Write TODAY for full information.



MODEL MAKERS! TRY PLASTIC WOOD

For modeling airplanes, ships, coaches, trophies, puppets—**PLASTIC WOOD** is an ideal medium. It handles like putty; hardens into wood. Moulds readily—and when dry can be carved to secure any details desired. In cans or tubes at paint, hdwe., 10¢ stores.



PLASTIC WOOD

OLD ENGLISH CEMENTS

This "fixer" quickly and permanently joins and repairs china, glass, wood, celluloid. Excellent for use in model airplane making.

**TRANSPARENT
OR METAL COLOR**



CANADIANS

All types Gas and Rubber Models in Stock. Send for FREE Price List.

The Crawford Radio

King Wm. & Hughes

Hamilton, Ont.

**Look Here Men! . . . This
New "Speed King" Will Give
You the Race**



1940 CATALOG

Always new and up to date. Contains everything imaginable included in hobby world. Loose-leaf supplements of new things issued regularly. only 25¢

A new low-priced marvel. You'll like it! Rear drive. Case hardened gears run in oil. Cork faced cone clutch. All metal parts completely machined. Easily assembled. Detailed plans. Kit complete with flywheel and . . . \$15.00

TRADE IN YOUR OLD MOTOR Get that latest improved motor you wanted . . . we will trade with you . . . let us know what you have and write for our proposition.

We are headquarters! Our line of everything in the hobby field is most complete. Includes airplanes, boats, racing cars, motors and supplies . . . Megow Headquarters.

HOBBY CRAFT STORES, Inc.
Dept. 104, 112 W. 42nd St., New York

feet, it is the largest amphibian in the world today. The ship is rather similar to the famous twin-engined Consolidateds now used by the navy. A nose wheel retracts into the bow like Frank Courtner's single-engined job built at the Edo plant several years ago . . . remember? Consolidated is making full use of their Davis airfoil and when their new four-engined patrol bomber is completed it will have performance plus.

Douglas has been testing a new navy low-wing ship somewhat similar to the Northrop BT-1 and BT-2 except for a redesigned tail, new powerplant and flush type landing gear that retracts inwards into the center section. In the meantime Douglas formulates plans for a DC-6 and has already run wind-tunnel tests on the airplane, but as yet she has kept details successfully secret. So has Jack Northrop with his new venture. We can state however that he has many more than one design just in the offing, and they will have exceptional engineering achievements.

And here is a little news from Lockheed: Their new four-engined low-wing transport will have three rudders and a nose wheel. Look for it early this summer. Following the navy's purchase of a Lockheed 12 equipped with a nose wheel, the army ordered a Lockheed C-40, which is the same as the Model 12. This ship was also equipped with a nose wheel (not retractable) and designated the C-40B. It is one of the most thoroughly radio-equipped airplanes ever built and will be employed by the army air corps for extensive blind landing tests; its nose wheel feature being a great asset for such tests. Lockheed is now underway with another 200 plane order for Great Britain.

While Curtiss is recovering from the surprise of a 650 pursuit plane order from France as a Christmas present, Vultee is reported as having very good results in tests with its new Vanguard "pea-shooter." It does 420 m.p.h. at 20,000 feet with a 1,600 hp. Pratt & Whitney Twin Row up forward. It has a span of 35 feet and a length of 29 feet, all making a bundle of 6,000 pounds approximately. It is designed to carry a mighty little 22 millimeter aircraft canon, demolition bombs or electrically operated machine guns. Having watched the single-seat low-winger perform, we can safely say that it is the fastest ship in this country at the present time. The long legs of the landing gear retract inwards and doors in the belly lap over them. The tail wheel retracts also. The important fact about the design of this newest of Uncle Sam's weapons is that the 18-cylinder radial engine, completely enclosed, actually works and keeps cool successfully!

While on the subject of powerplants here is some very important news on a new little ship on the West Coast that has reaped the benefits produced by those little Menasco-powered racers at the National Air Races. It is none other than North American's new NA-35 two-place, open cockpit, low-wing monoplane for sport and training purposes. It is the nearest thing to mass production yet . . . no spars, almost 100 percent monocoque fuselage and positively ALL-metal. Its

performance is wonderful and its price is well below anything in its class. And the other big item about the plane is that the Menasco engine installation was designed by Art Chester, famous racing pilot. Art was able to design a cooling system on his racer this year to make his low-powered Menasco turn up enough revolutions to average 264 m.p.h. in the 1939 Greve Trophy Race around a tight, closed course to break all records for that event. We will give you all the details on this sleek little North American Aviation creation in our next issue where we will have more room to do it justice. It was designed, built and flown in less than two months' time!

Somewhat along the same lines as the NA-35 is Ryan's new PT-20 training ship for the army air corps. It is a development of the PT-16 (Ryan) already undergoing the vigorous onslaught of student training. Other fine looking "half pint" jobs of Ryan's to watch are the two single-place pursuit trainers Ryan will construct for China. They will be powered by 4-cylinder C-4, 165 hp. Menasco engines as will 48 other two-place ships going to the same destination. Ryan will get over \$10,000 each for the single-place low-wings which is a good margin of profit.

With these and the several hundred more deadly fighting craft ordered recently from many other companies, such as Vultee and Republic to name two, Japan is going to feel sorry she ever began her campaign against China. China has followed a very sensible program in developing her air power by purchasing good equipment in both the trainer and fighting class and now has thousands of expert mechanics who have received their training in the United States.

Following are the specifications of Martin's twin-engined light bomber for France:

Wing Span—61 ft. 4 in.; Length—46 ft. 8 in.; Height—16 ft. 3 in.; Wing Area—538 sq. ft.; Gross Weight—15,280 pounds; Weight Empty—10,586 pounds; Useful Load—4711 pounds; Overload-Useful Load—6807 pounds; Fuel—255 gallons; Oil—16.5 gallons.

Powered with 1,200 hp. engines the Martin has a top speed of 316 m.p.h. at critical altitude.

In the same class as the Martin is Stearman's new YA-21 attack-bomber that just took the air last month. The most noticeable diversion from the prototype is the break in contour at the nose for a pilot's windshield; the pilot formerly having had to look through the bombardier's enclosure to see where he was taking the bombs and crew. It is a twin-engined high-wing monoplane with a span of 65 feet, and we would like to see the U.S. Air Corps order more of them.

In the sportplane field we see that Richard DuPont, noted glider pilot, is thinking about building helicopters. Igor Sikorsky has built, test-hopped one; and the "Hummingbird," which we mentioned in past issues, is almost completed. It has two sets of rotors of ten 12-foot blades, is 38 feet long and is powered with a Hisso engine. More of this job later.

Martin Jensen, noted Dole flier, has

MEET THE WINNER OF THIS YEARS NATIONAL CHAMPIONSHIP



NOW...

Henry Struck's
newly invented
folding propeller
contest endurance
model.

"Flying Cloud"

44 Inch Wingspan



\$100

The FLYING CLOUD 44" wingspan contest endurance model for Wakefield and Moffett International competition.

195 Sq. Inch wing area

Designed by Henry Struck . . . America's No. 1 all-around Contest Builder.

1938 Indoor National Champion 1939 N.A.A. Gas Model Record Holder
1939 Wakefield Team 1940 N.A.A. Gas Model Record Holder

1948 National Flying Scale Model Champion, and the newest addition to the BERKELEY Designing Staff.

Flying Cloud is now available to you after having been subjected to one of the most rigid tests. The propeller retracts into the fuselage when the rubber band motor unwinds. This lessens air resistance giving you those valuable extra contest flying minutes in the air. No wonder she is hailed as the 1940 champion . . . the Flying Cloud is the result of five years consistent experiment, improvement and research on the same Wakefield design. Twenty-three test models were built before this Flying Cloud, wonder of the air, was offered to you. Surprisingly enough is the fact that every one of these models finally disappeared in the clouds on flights up to three hours duration. At the 1939 National Contest Henry Struck turned in a seven minute time on the Flying Cloud's first flight, disappearing in the clouds. This earned championship recognition for the Flying Cloud and she was immediately placed on the Wakefield Team. Quickly building another Flying Cloud, Struck was again ready for the 1939 Wakefield Contest of New York City. The day before the contest, the Flying Cloud was taken to Bendix Airport for a trial spin to be finally tested and tuned for the next day event. To the amazement of the experts of every country, the ship demonstrated that she had what it takes to be classified as a Champion . . . the trial proved she could stay in the air for over one minute on the hand glide without any power. On the very first flight she disappeared high in the blue after 26 minutes. Now you can build this sensationally new model from the great and complete BERKELEY kit. And more startling is the fact that the Flying Cloud is so easy to build . . . build the Flying Cloud for your next contest entry because she won't disappoint you but will bring home the prize with true champion's performance. The

Flying Cloud is the only complete endurance model on the market which includes these exclusive star features:

- Propeller retracts flush into fuselage sides.
- All propeller parts ready-made.
- Rubber tensioner, ready-made.
- All wire parts ready formed, including landing gear, rubber hooks and tail skid.
- Kit also includes: illustrated plans, cement, clear dope and all wood parts, ready-cut or printed out. Fly tomorrow's winner today!

PRICE \$1.00 COMPLETE (less rubber)
AT YOUR DEALER 10c extra by mail

Berkeley
MODEL SUPPLY CO.
230 STEUBEN ST. B'KLYN, N.Y.



ENTIRELY NEW CHAMPION RACING ENGINES

BLUE CROWN CHAMPION—America's first strictly stock race car engine. Holds the W S Van Dyke III trophy for the mile on an oval track. 603 cu in. displacement, twin rotary valves, 2 carburetors, super ported, new cooling features, 7/16" shaft, develops 1/4 H P., with flywheel, coil and condenser . . . \$23.95

RED CROWN CHAMPION—Companion to the Blue Crown Champion except for single gravity carburetor and rotary valve. Finest standard race car engine you can buy, complete with flywheel, coil, condenser, \$18.20

Also 1/4 H P. airplane engine at \$18.50 and 10 c. c. double suction carburetor marine engine at \$22.50

SPEEDWAY CHAMPION—This entirely new revolutionary car being introduced this month. Ask your dealer today—it will be America's fastest, most distinctive car

SPEEDWAY SPECIAL—Advanced 17-5/8" standard design (see photo) front gear drive, completely finished in red or blue, ready to assemble, less engine . . . \$19.50

WASP SPECIAL—This 14" Class B midjet type racer for all 1/7 H P. engines is now sold exclusively by Champion. Easy to build Kit with friction drive and all necessary parts, less engine, \$9.95. Gear drive \$1 additional



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Midwestern Gas Model Headquarters

TROST Model Airplane Shop

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made another stab at the aviation game and this time with the successful test flying of a new sportplane he expects to manufacture. It is a full cantilever low-wing monoplane of plywood covering powered by a 60 hp. engine. Top speed is 110 m.p.h. and landing speed 40 m.p.h.

Piper has a new little tapered high-wing monoplane under flight test to compete with the Stinson "J05." They also may come forth with an amphibian.

Vance Breese, the pilot of the hour, not being satisfied with test flying all of Vultee's, North American's and Douglas's new aircraft has taken on the job of doing the initial testing of the new Timm wood-Bakelite low-wing trainer. It is an excellent ship, and we will detail it following the North American NA-35 next month. The newest plane in the German Reich since the war is a sleek

twin-engined light-bomber. Watch for details on it.

Most of us think of the war as being "over there," across the ocean, thousands of miles away. To be sure we are aware of its economic nearness, and of our function as airplane builders for those nations, but active, energetic model builders are too prone to believe that the war is something found only on the front pages of our morning and evening newspapers.

But we have a duty to perform in this war. Most of us are employed in some field of aviation, from the confidential design rooms of large aircraft factories to the plane-wipers at airports. Those of us who are not are continually discussing, studying and dealing in airplane drawings, designs and topics even though our daily job seems far removed from things aeronautic.

Save this list and add to it from month to month with additional figures published by MODEL AIRPLANE NEWS.

New American Military Aircraft

Company	Designation	Type	Quantity	Price	Engine
Air Research, Inc.		Exp.	2		W R-975E2
Barkley-Grow					
Beech	C-45	Photo.			PW R-985
Bell	P-39	Pursuit	80	\$ 2,833,236	A V-1710-35
	YP-39	Pursuit	15		
Bellanca	YO-50	Observ.		181,693	
Boeing	B-17C	H. Bomber		8,102,892	W R-1820-65
Consolidated	YB-24	H. Bomber		8,613,674	PW R-1830
	B-24A	H. Bomber			
	XPBY-5A	P. Bomber			
	XPB2Y-1	P. Bomber			
Curtiss	P-40	Pursuit		12,872,398	A
	P-42	Pursuit			PW
	O-	Observation	203	5,203,481	PW R-1340-51
	XSO3C-1	Scout-Observ.			R
Douglas	B-19	H. Bomber	1		
	B-23	Med. Bomber	40		W
	A-20	Attack-Bomber	123	14,470,082	W
	A-20A	Attack-Bomber	63		
	B-	H. Bomber	5	4,000,000	
DuBois-Martin		Fighter			
Fairchild	PT-	Trainer	270	1,586,573	R 6-440C-2
Grueman	F4F-3	Fighter			
Lockheed	YP-38	Pursuit	15		A
	P-38	Pursuit	44x	4,653,703	A
		Navy Exp.	1	117,668	
Martin	P-15	Med. Bomber		16,125,586	PW R-2800
	YA-	Attack-Bomber		500,000x	W
	PBM-1	P. Bomber			
North American	B-25	Med. Bomber		11,771,000	PW R-2600-9
	AT-1	Adv. Trainer		1,326,000	PW R-1340
	BT-14	Basic Trainer		2,707,000	PW R-985
	BC-1A	Basic Combat			
	BC-2	Basic Combat	3		
	SNJ-1	Scout-Trainer			
Republic	XP-41	Pursuit	1		
	YP-43	Pursuit	15	974,325	
	P-	Pursuit	80	3,547,256	PW R-2800-7
Ryan	YO-51	Observation		132,020	PW R-985
	PT-16	Prim. Trainer	30		M C-4 Pirate
	PT-20	Prim. Trainer			M
	YA-21	Attack-Bomber		500,000x	PW
Stearman	PT-13B	Prim. Trainer		2,843,405	L R-680-11
	-17				
	-18				
Stinson	O-49	Observation		1,853,451	L R-680-9
St. Louis	PT-15	Prim. Trainer	15	139,419	W R-760
Vultee	BC-3	Basic Combat		90,000	
	BT-13	Basic Trainer		3,029,036	PW R-985
		Pursuit			
	A-19	Attack	7		
Vought-Sikorsky	OS2U-1	Observ.-Scout		2,103,800	R.
Waco	PT-	Prim. Trainer		93,545	

PW-Pratt & Whitney
W-Weight

M-Menasco
L-Lycoming

R-Ranger
A-Allison



WEEK AFTER WEEK at the new banked miniature speedway, proving ground for miniature racing cars in Los Angeles, finds the Mercury Midget powered by Dennyrite dominating the field. So powerful are these machines that no other racer has been able to successfully compete. Consistently the Dennyrite and Mercury Midget combination defeat all competition.

No "jalopy" has ever won at Indianapolis. It takes *quality* workmanship and *precision engineering* to be a winner with miniature racing cars. **BUY THE WINNING COMBINATION.** The Dennyrite motor and Mercury Midget are built up to a standard of quality, not down to a price.

Ask your dealer to show you a Mercury Midget and demonstrate the Airstream Dennyrite.

SPECIFICATIONS—Displacement .57 cubic inch—bore 9/10—stroke 9/10—two cycle 1/4 horsepower at 6500 r.p.m. Height overall including spark plug 4 1/2 inches. Length overall 5".

The New

"DE LUXE" MERCURY MIDGET RACER



Can be assembled
ready to run in
2 HOURS!

NEW "DE LUXE" MERCURY MIDGET

Rear wheel drive—All metal body complete, prefabricated, machined and polished, ready to assemble—Drive unit gears run in oil in totally enclosed housing. Kit (less flywheel and motor) **\$23.50** postpaid

ORIGINAL FRONT DRIVE CAR KIT

Case hardened steel gears completely enclosed in aluminum housing, cast aluminum frame and all materials necessary, including detailed plans for constructing body. Kit complete. **\$19.50** postpaid

DE LUXE AIRSTREAM

Complete with coil, condenser, Dural motor mounts, De Luxe long exhaust and exclusive spring choke. **\$17.85** postpaid

STD. AIRSTREAM

Complete with coil, condenser and short exhaust stack. **\$15.85** postpaid



AIRSTREAM UNIT

Same as Standard Airstream less coil and condenser. **\$13.85** postpaid

DON'T SPEND ALL OF YOUR TIME IN THE PITS

The "De Luxe" Mercury Midget has an envious reputation for speed and trouble-free dependability. Wherever you see the Mercury Midget, you see a car that is ready to go.

HOLDS WORLD SPEED RECORD OF 62.23 m.p.h.

EXCLUSIVE FEATURES OF "DE LUXE" MERCURY

Rear wheel drive—Cast aluminum frame, machined and polished, with X member for rigidity—Chassis mounted on 4-coil springs with rubber snubbers—All metal body complete, pre-fabricated, machined and polished ready to assemble. Four heavy duty radius rods, ball and socket type I-beam front axle—Drive unit includes case-hardened steel gears running in oil and completely enclosed in aluminum housing.—Car furnished completely machined and ready for assembly (less flywheel and engine).—Car is perfect scale model of most modern midget race cars.



The Original
MERCURY MIDGET

GARDNER RACING WHEELS

With the Gardner racing wheel two sizes, 6.00 x 17—approximately 3 3/4" and 6.75 x 17—approximately 4", a scale effect is obtained, as nearly all midget racing cars use larger wheels on the rear. For a higher gear ratio 4" wheels on the drivers will give greater speed. Polished chrome plated wheels, bronze bearings for standard 1/4" axle, racing type rib tread, finest tread rubber obtainable. Tires are locked to wheels.

6.00 x 17.....\$1.10 each

6.75 x 17.....\$1.25 each

DENNY ACCESSORIES

FOR RACING CARS

Flywheels, 8 oz.....	\$1.00
Special Flywheel, 16 oz.....	\$1.50
General Batteries, ideal for racing cars— 3 sizes	25c—50c—75c
Aluminum Exhaust Pipes.....	\$1.25
Special Exhaust Pipes for ported motors.....	.85c
Dummy Pumps65c
Steering Wheels	\$1.00

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By BERKELEY "AIR-SCREW" PROPELLERS

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MANUFACTURERS

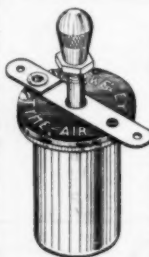


All we ask is that you test an "Air-Screw" propeller alongside of any other design, regardless of price. You will find them to be so superior that you will use them always.

8" to 15" Diameter **25^c** EA.

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The accurate air-draulic flight timer that works on a two-valve principle, assuring you exact timing on every flight. Ask your dealer to demonstrate the "Time-Air" for you today. Weighs only ½ oz. Accurate setting up to one minute. **ONLY \$1.00**

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Germany's Air Force Wages War

(Continued from page 7)

hollow propeller hub and two synchronized rifle calibre machine guns. On April 27th, 1939, Captain Fritz Wendel flew a specially prepared Bf.109 at 468.92 m.p.h. over a 2 kilometer course for the world's landplane record. For this purpose the wings had been shortened and additional fin area added beneath the fuselage. The plane was powered by a special D.B.601A of 1,800 horsepower.

Large numbers of the Bf.110 are going into service. A twin engined low-mid-wing monoplane powered with two D.B.601A engines totalling 2,400 hp., it has a top speed of over 400 miles per hour armed with two shell guns and four rifle calibre machine guns. The wing area totals 1100 square feet.

Reserve units are flying the Heinkel He.112U, a larger and heavier machine than the Messerschmitt. Distinguished by its thick sectioned, elliptical wings, the He.112U is powered by a D.B. 600 inverted vee-twelve and carries two machine guns in the fuselage and two 23mm. cannons in the wings. Of all-metal stressed-skin construction, it has a maximum speed of 325 m.p.h., landing speed of 78 and a 500 mile range. The He.112F, which varies only in equipment, is being supplied to Rumania and Sweden.

The latest in experimental fighters is a Focke Wulf fitted with a D.B.601A pusher engine and using a tricycle landing gear, and a Blohm and Voss high-wing twin engined monoplane with two B.M.W. radials that have the now popular oversize spinners covering the entire cowl diameter.

However, the most important part of the Luftwaffe is the light, medium and medium-heavy bombers; their known destructive power being highly regarded by the regular army. The nucleus of the medium-heavy class is the Heinkel He.111, a military adaptation of a civil type. Powered with two D.B.601A engines the new, blunt-nose He.111 carries a crew of five and a ton of bombs at a top speed of 260 miles per hour. Of all-metal, low-mid-wing design, the range fully loaded is 2,000 miles and the climb to 7,000 feet takes only eight minutes. There is a gunner's turret in the fully glassed-in nose which extends to the pilot's cabin, one in a glass blister over the wings and another beneath the fuselage in an enclosed pit which is also the bomber's position.

The latest medium-heavy machine is the newer Junkers Ju.88 in production with either Junkers Jumo 211s or D.B.601As. Ju.88s came rolling off the production line in May, just three months after the prototype established an international record for twin motored types by flying 621.37 miles over a closed course with a 4,410 pound load at an average speed of 321.25 miles per hour. The standard Ju.88 carries a crew of five and a ton of bombs 1,200 miles at a cruising speed of 275 m.p.h. It varies from standard Junkers design in having smooth-stressed-skin-covering throughout and a single rudder. The nose is glass-enclosed to the pilot's cabin, and the gunner-bomber's position aft of the wing also has a number of transparent panels. The Ju.88 is being eagerly accepted by German crews because of its ability to fly on

one engine, a failing of the older He.111. For lighter bombing, "mopping up" and long-range reconnaissance, the Luftwaffe depends on its sleek Dornier Do. 17 "flying pencils," of which there are several versions in action. Generally it is a high-wing twin engined monoplane of all-metal construction with a range of 1,490 miles and a crew of three.

The fuselage is stressed skin, flush riveted to which several coats of rosin have been applied, covering every rivet mark and plate joint with a very smooth surface. The wings are built-up on two open Warren-girder spars and metal covered, except for the fabric on the under surfaces of the wings. The bomb compartment is in the fuselage between the two spars.

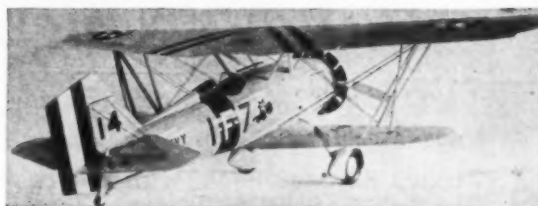
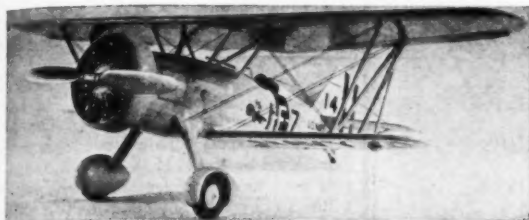
Take-off is exceptionally short and steep; the Do.17 leaves the ground with the nose pointing up at what seems to be a very uncomfortable angle which it holds for some time. The latest version in production, the Do.215 with 2 Jumo 211s, embodies an underslung nose which deprives it of some of its sleek lines. This has been done to give room to an additional crew member, the bombardier. The 215 is fitted with wing slots, similar to those on the Lockheed 14, and larger flaps.

The Luftwaffe makes extensive use of the lighter single engined machine for the destruction of railways and bridges and attack on ground troops. The necessary qualifications for this type appear in the Junkers Ju.87, an all-metal low-wing monoplane with fixed undercarriage. The Ju.87 is an awkward appearing machine, with its inverted gull wings, but has had a very good service record both in Spain and Poland, where it was used in quantity. An 1100 pound bomb is carried beneath the fuselage between the landing gear, in a special rack which drops the projectile clear of the propeller when the plane is in a dive. For this dive bombing flaps are fitted under the leading edge of the wings to keep the speed of the plane under control in the dive before releasing the missile. With the Jumo 211 engine the Ju.87 has a top speed of 225 m.p.h. and a range of 700 miles.

In support of these active types is the Henschel Hs.126 powered with a B.M.W. 132 Dc "Hornet" radial of 880 hp. built under Pratt & Whitney license in Germany. Similar in many respects to the American Douglas O-46A, the Hs.126 is used for photography and artillery cooperation. For light attack work it carries ten 20 pound bombs and two extra guns mounted in the wings firing clear of the propeller. Maximum speed is 220 miles per hour, and the hydraulically operated flaps give a landing speed of 60 m.p.h.

The factories and airfields building and housing these fighting ships are all built for protection in war. Because of the virtual control of the government over production facilities, they have all been laid out under Air Ministry planning. The factories are very large and so arranged as to defeat the possibility of air raiders destroying them in single swooping attacks. For instance the largest single plant in operation is the Ernst Heinkel works at Oranienburg, a short distance from Berlin. The roofs are low and rounded, painted the flat bluish green characteristic of the ground in the neighborhood and even in bright sunlight they give no

NEW CURTISS HAWK F11C4 NAVY PURSUIT



32½" Span. Length 22¾" 1" Scale. Weight 6 oz. Color gray, top wing yellow.

THE MOST EXCLUSIVE AND FINEST EQUIPPED MODEL IN THE WORLD. MOVABLE CONTROLS WORK FROM COCKPIT. A special de luxe model, one of the most beautiful ever made. Set contains a 4½" scale Wright Cyclone celluloid motor, detailed push rods, fins, etc., like real motor, 4½" aluminum cowl, 10" steel type carved prop shown, 2½" wheels, tail wheel, star and rudder insignia and lettering, rubber, windshield, instrument board, flying wires, 4 aluminum step plates, aluminum wing walls, ready cut wheel pants, washers, 3 oz. grey paint, ½ oz. yellow, ½ oz. red, 2 oz. glue, etc. All other parts are printed on balsa wood. 35"x14" scale \$4.50

Const. set, complete in labeled box, postpaid.

NORTHROP A-17 ARMY ATTACK



24" Span. Length 17". Weight 2¼ oz. ½" Scale
Colors yellow and blue

A new scale model of one of the 125 Northrops ordered for the U. S. Army. Set contains all parts printed on balsa, turned motor front, 1" carved propeller, insignia, wheels, set of colored dope, glue, and all parts. \$2.00

Const. set in labeled box, postpaid.

NEW SEVERSKY P35 ARMY FIGHTER

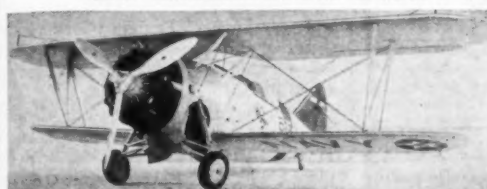


32" Span. Length 25", 1" Scale. Color, Silver

A brand new model of the 1938 Bendix Trophy Winner P 35. Set has 4" turned balsa motor front, 10" carved prop. balsa wheels, tail wheel, rubber, all parts printed on balsa, 3 oz. silver dope, ½ oz. black, 2 oz. glue, etc., insignia, and full size \$3.25

scale drawing. Const. set in labeled gift box, postpaid.

NEW GRUMMAN F3F-1 NAVY FIGHTER



32" Span. Length 23¾".
1" Scale. Color grey, etc.

Const. set has all parts printed on balsa, set of 4-color paints, glue, wheels, colored insignia, rubber motor, 4" turned balsa motor front, full size drawing, and all parts to build as shown. \$3.75

Set, p.p. \$3.75

NEW HAWKER HURRICANE ENGLISH PURSUIT



27" Span ¾" Scale. Dark Grey and Silver

A beauty of the plane now fighting in Europe. All parts printed on balsa, set of colored paints, glue, etc. Full size drawing \$2.50

and all parts, postpaid.

LOCKHEED VEGA NAVY FIGHTER



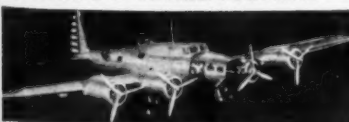
41" Span. Length 26". 1" Scale. Color, grey
Set has turned motor front, all parts printed on balsa, colored paints, 11" prop shown, full size drawing. \$4.50

BOEING F4B4 NAVY FIGHTER



22½" Span. Length 14½". ¾" Scale.
Set has 3" celluloid motor, 3½" tapered aluminum cowl ring, set of paints, etc. Postpaid. \$2.95

BOEING B-17 FLYING FORTRESS



44" Span. Length 30". Color, silver.
Set has all parts printed on balsa, four 3" turned balsa motor fronts, four 4" carved props, celluloid wheels, set of paints, glue, and full size drawing. Set postpaid. \$4.95

CURTISS P36 ARMY PURSUIT



37" Span. 1" Scale. Color, silver
Set has turned motor front, set of paints, glue, all parts printed on balsa, and full size drawing. Set, \$3.25

BOEING P26A ARMY PURSUIT



22" Span. Length 17½". ¾" Scale
Set has 3" celluloid motor, 3½" tapered aluminum cowl ring, paints, etc. Postpaid. \$2.75

LOCKHEED ELECTRA



27½" Span. Length 19". ¾" Scale.
This is an exhibition model, with all parts printed on balsa, two 3" celluloid motors, two 2" aluminum cowl, 4" chromium prop, two 1½" M & M pneumatic air wheels, set of paints, and all parts. Set postpaid. \$4.50

NEW 1940 CATALOGUE 10¢—Large 7½" x 10".
Beautifully illustrated glass models, Motors, etc.

LOCKHEED P23 NAVY FIGHTER



COMBINATION LAND AND SEA PLANE SET

32" Span. Length 20½". Weight 3½ oz. ¾" Scale.
Model will rise from land or water in few feet. Construction set contains fuselage and pontoon formers, wing ribs, tips, etc., printed on balsa, a 3½" turned cowl front, 2 instrument boards, colored insignia, lettering, windshields, 8" carved scale flying prop shown, 3 oz. silver paint, 1 oz. cement, ½ oz. black, 2 oz. glue, 2" aluminum wheels, rubber and large 35" x 44" drawing of land and sea plane. Construction \$2.95

BOEING F4B4 NAVY FIGHTER
Solid Exhibition Model

22½" Span. Length 14½". ¾" Scale.
Set contains completely finished balsa fuselage, with cockpit cut out, motor hole cut out and headrest attached; all you have to do is paint it. The wings, tail, and rudder are all cut to shape, but have to be sanded to proper curve. A 3" celluloid motor with aluminum motor front, 3½" tapered aluminum cowl, 1" scale chromium plated propeller, celluloid wheels, complete set of colored paints, glue, filler. \$4.50

and full size drawing. Set, postpaid.

Don't miss this 1940—No. 6
Catalogue ready Feb. 1st.

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Announcement

A new 1940 Model Motors catalog is now available for 5c. This is a beautifully illustrated 32 page book, with two-color cover, showing the standard types of motors now made and the specifications of each. Your local Model dealer has these new catalogs. Get yours today. If your dealer's supply is exhausted, write direct.

**HURLEMAN
DISTRIBUTING CO.**

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reflections. Each one of the structures has three underground tunnels leading to bomb-proof shelters away from the buildings.

These undergrounds have all the necessities for taking care of the workers during a raid; bunks, kitchens, cigarette machines and offices for the officials.

A half-million men and women are engaged at present in turning out planes and equipment for the Luftwaffe and government supervised trade schools in the plants are training the workers of the future. The total personnel of the Luftwaffe itself has passed the 250,000 mark to compare with the 160,000 in the combined forces of France and Great Britain.

Military fields are built so as to be practically unnoticeable from the air. Administration offices are underground; barracks and recreation rooms appear to be private estates surrounded by gardens, swimming

pools and all the other luxuries of the wealthy landowner. The hangars are usually several hundred yards from the flying field itself and are thoroughly camouflaged. In many cases, what appears from the air to be links of the autobahnen or highways, are in reality runways! This seemingly over-elaborate system has been built with one thought in mind, the threat of war.

Progress of the naval air arm of the Luftwaffe has not as yet approached the efficiency of army units. So far real progress has been made only in the torpedo-bomber and reconnaissance types. For coastal defense it is dependent on regular army Messerschmitt and Heinkel fighters. Her lone aircraft carrier carried three Messerschmitt 109s which were being tested for possible deck fighter equipment. These differed from the standard model in having the rudder mounted above the fuselage and

a conical tail cone with retractable deck hook. There was an additional small fin area mounted under the fuselage. As test ships they were marked with orange and silver bands around the wings and fuselage together with the regular crosses and swastikas.

The Luftwaffe's torpedo-bomber-reconnaissance equipment consists of Arado Ar.95s and Heinkel He.114s. The Arado is an all-metal biplane with folding wings powered by the B.M.W. 132 Dc radial and is used as a landplane or fitted with twin floats. Carrying an 1800 pound torpedo and a crew of three, its maximum speed is 188 with a range of 1,500 miles. When a sea-plane, auxiliary tanks in the floats carrying 129 gallons of gasoline; as a landplane 36 gallons are carried in tanks fitted in the pants.

The Heinkel He.114 is coming off the production line in quantity. Strictly a sea-plane, it is an all-metal sesquiplane using the B.M.W. 132 N "Hornet" of 860 hp., giving it a top speed of 208 m.p.h. and a range of 550 miles. With a crew of two it carries two 110 pound bombs for submarine patrol. The twin floats are made of Hydro-nalium, developed in German laboratories for aviation use.

Going to the multi-engined types, we find the Heinkel He.115, a five-place all-metal twin floatplane fitted with two D.B.601As and carrying a ton of bombs. A long series of sliding panels enclose the pilot, navigator and rear gunner. Designed for long range scouting and torpedo-bombing, the He.115 has a range of 1,300 miles at a maximum speed of 220 miles per hour.

Since the outbreak of the war, Germany's catapult ships, the Dornier Do.18s and Hamburg Ha.139 0.1 and Ha.139B floatplanes, which were used for the commercial mail and freight service in the South Atlantic, have been requisitioned for naval reconnaissance and spotting work. The Do.18 fitted with military equipment including fore and aft gun pits has a cruising range, with its tandem Diesels, of 3,000 miles at a cruising speed of 135 miles per hour.

The Ha.139 0.1 is a four engine inverted gull wing monoplane using tubular monospar wing construction. With a crew of four it has a range of 3,000 miles cruising at 165 m.p.h. The Ha.139B is the later model, having larger wings with less of a "gull." The engines are Junkers Jumo 205 C Diesels of 600 hp. each.

Still undergoing acceptance tests is the Ha.138, an unusual three engine flying boat with a short central hull and outriggers from the wing supporting the tail surfaces. Powered by three Jumo 205 C Diesels of 600 hp. each, the top speed is 175 miles per hour with a cruising range of 1,400 miles. Besides the pilot and navigator there are three gunners; one in the nose and two in the tail of the hull in staggered positions.

In service and in production is the large Dornier Do.24 airboat, a high-wing monoplane powered with three B.M.W. 132 Dc radials and weighing 15 tons. The Do.24 was the winner of a design competition held by the Netherlands which contained some rather high requirements; among them being the ability to land and take off under difficult water conditions, in which it suc-



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Specifications. Wt. ready to run 6 3/4 oz. with 3-volt coil, condenser, carburetor, plug and two pencils for current. 3/4" Bore, 3/4" Stroke—Height 3 1/4". Length 1 1/4"—Speed 250 R.P.M. up to 3000 R.P.M. using an 11" prop.—displacement, .18 cu. in.

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passed. The Do.24 has a high speed of 210 miles per hour and a range of 2,500 miles with a crew of five or six. There are three gunners' positions with rotating turrets in the nose, behind the parasol wing and another in the tail between the twin rudders.

Since the outbreak of hostilities now involving England and France, civil aviation in Germany has ceased to exist because of the possible interception of its commercial aircraft and in order to conserve its precious resources; fuel and metal which must be fed to the hungry war machine now in action. German aircraft is now bent on destroying or crippling the rich cities over which her airliners had passed in peaceful commerce. Thus "wings" have again been relegated to the task of sowing waste and hatred, because of the greed of a man.

Gas Lines

(Continued from page 21)

who is intently watching another ship land on the run-way while he is waiting for an opportunity to fly an Italian version of the Dolphin gas model, shown at his right. The picture was taken at the Littorio Airport, Rome.

Picture No. 7 shows a clever little gas model, designed and built by Blake Arnold, Jr., of 91 Savannah W., Detroit, Michigan. The fuselage is of simple box construction built up of framework covered with balsa sheet. However it is of such a shape that it is very efficient. Complication does not always mean efficiency. Arnold made a fine job of his plane. He flew at the Nationals in 1939. It is powered with a Brown D motor; the wing has a span of 60 inches, a chord of 9-3/4 inches and embodies a Clark Y section. Arnold wants to know if the curved tips should be taken into account when figuring the center of pressure. As a rule, the center of pressure position may only be ascertained if extensive tests are made in a wind tunnel, in which case the average curved tip has very little to do with the fore and aft position of the center of pressure.

Picture No. 8 shows one of the finest scale jobs that has come to our attention. It is an exact scale model of a North American observation plane, which took R. C. Stout of 801 S. Eucalyptus, Inglewood, Calif., eleven months to complete. It was made from exact specifications of the big ship and has operable, retractable landing gear, landing lights and passing lights. The entire plane is of balsa wood covering and has all sliding enclosures. The top flying speed is approximately 55 miles per hour. It has a wing span of 57-1/2 inches, a weight of four pounds, three ounces and a wing loading of 20 ounces per square foot. Power is supplied by a 1/4 horsepower James motor. With these specifications, we can readily see why the ship flies 55 miles per hour.

Picture No. 9 shows a most unusual type of gas model flying, developed by Victor Stanzel of Schulenburg, Texas. Believe it or not, in the picture which shows him in the left corner, he is flying a gas model at the end of a fish line. By the means of a pole to which the line is attached, he is able to guide the course of the model in a circle up and down.



Ideal MODELS

(at official Eastern States Gas Model Championship)

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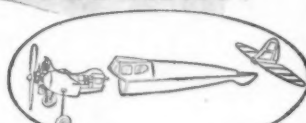
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the necessary moulded fuselage sides, cowl, pants, bombs, motor, etc., sawcut propeller, scale and peller parts, formed wire hooks, scaled wheels, brass bushings, ribs printed out on balsa, turned wood parts, tail wheel, fork fitting, wire, para rubber motor, colored paper, authentic markings, colored insignia dopes and easy to understand plans, all are packed in a beautiful, sturdy box.

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Wing Span 18 $\frac{1}{4}$ "

\$1.25

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All parts complete with spark plug coil and condenser. $\frac{1}{2}$ HP. $\frac{1}{4}$ Bore. Very simple only a screw driver is necessary and 30 minutes and you have a motor ready to run for \$5.00.

SELLEY MFG. CO., INC.

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This is an excellent system for fellows who cannot or do not wish to take an extended cross-country hike. This should prove extremely useful inasmuch as the flight characteristics of the model may be carefully studied by employing this method. Under these conditions it is not necessary to restrict the time of flight to a mere twenty seconds.

Picture No. 10 shows a close-up of Mr. Stanzel's model. It is a beautifully designed low-wing and has an unusually fine finish. Stanzel says that this model has flown as fast as 75 miles per hour. To fly a model at this speed, without disastrous results, would be impossible unless you employed Mr. Stanzel's method. Perhaps in the near future some of our model fans will be seen going on a "fishing trip" to the airport.

James Clark of 3042 S.E. Belmont Street, Portland, Oregon, writes and tells us that he and a number of model fliers have just organized the Northwest Model Airplane Club, with forty members and more expected to join in the near future. Mr. W. A. McLain of Los Angeles supervises the group. Mr. McLain is a former stunt flier and pilot who has been bitten by the model airplane bug. The club flies every Sunday, rain or shine. One of its unusual ships is shown in picture No. 11. Do not let the simple type of construction fool you: It is only a stick model but near the tail is attached a smoke screen.

Picture No. 12 shows what happens when the model is in full flight. Here you see the same model streaking for the clouds and laying a smoke screen.

No doubt you have seen biplane gas models. However Mr. William Johnson of 401 South Main, Clinton, Indiana, has gone one step farther and produced one with a negative stagger. In fact it is a scale model of a Beechcraft, having a span of 5 feet and powered with a Forster 1/3 hp. engine. The plane is not exactly to scale but has been modified to facilitate

transportation and reduce the hazards of crack-ups. Picture No. 13 is a "shot" of this plane.

Unquestionably you have heard of the expression, "The Flying Box-car." This has been applied in general to ships of chunk-like proportions; angular in appearance and lacking in streamlines of any kind. However model builders should not be fooled by these appearances, for they are not always indicative of the quality of the performance that the plane will exhibit. Picture No. 14 shows a ship of this type and from its looks one would think that the performance was anything but good. However we cannot too strongly impress the fact upon model builders that the aerodynamics; that is, the proportion of surfaces, angles and positions of weights of any model, determines about 90% of the performance. The remaining 10% may be contributed to possible streamlines. In other words, a clumsy looking ship, properly designed, will very often out-fly a ship with beautiful streamlines and external appearances but embodying poor aerodynamic proportions. The ship in the picture was built by James Cody of Detroit, Michigan, Route 2, Box 4506. He calls it "Old Faithful" because it is such a consistent flier. He says:

"It has a 7-1/2 foot wing spread and is rather hard to transport. It has an exceedingly steep climb and at many contests has made the longest flight of the day. At one Michigan State meet it would have taken first place except it was ruled out due to too little weight. The following week it took second place with only one flight; though the time was based on a three-flight average. In this case it competed against the sky-rocketing type of planes and won out. It is powered with a Baby Cyclone engine."

Neil J. Pollock has recently been appointed correspondent of the Gas Model Aeronauts of Chicago, 2411 West 55th Street. He sends us a picture, No. 15, and some information of their activities. The picture shows activity in one of its recent contests. Some interesting items concerning the club's activities follows:

R. L. Webber was unanimously re-elected president of the Gas Model Aeronauts of Chicago, at the annual election on November 10th. Stephen Sadlek, winner of the Midwestern States Contest and the Chicago City Championship, is the new vice-president, while Jerome Walter fills the secretary's chair and Albert Solomon begins another term as treasurer.

The G.M.A. have the only large field in the Chicago area devoted exclusively to model flying. There is plenty of room on this field, located at 79th St. and Kostner Ave., where the Midwestern States meet is held. The Aeronauts intend to fly at this field all winter and conduct experiments with skis and other devices to popularize winter flying. Mr. Miles Stone heads the experimental committee and is assisted by G. Roberts and H. Bodinet. These boys are old hands at the game and will be a great asset to the club during the year in the field of research.

At the Gary, Indiana, Meet, sponsored and directed by Bob Roberts, H. Kuhn, Walter Beland, Steve Sadlek, Al Solomon and Jules Carrett (all G.M.A. boys) took

the first five places. It was a cold and somewhat damp day but a large crowd gathered to fly and the meet was very successful affair.

CLUB NEWS

New York

First Record

Henry Struck of the Queens Aero Model Association established what is believed to be a new N.A.A. Class C gas model record on Sunday, January 7, in the first 1940 meet to be sponsored by the Metropolitan Model Airplane Council held at Creedmore, L.I.

Despite the weather, which found a temperature of 12 above throughout the day of flying, several fine flights were reported. Struck's plane, a 3-pound high-wing silk-covered monoplane with a Brown B motor, averaged 2:04 for three flights. High time was 4:43 o/s after the ship had hit the only thermal extant on the occasion. As a matter of fact Henry had but two official flights, his others being :59 seconds and three delayed, the longest of which was 31 seconds... motor trouble due to the cold, it was reported.

Second was Sal Taibi of the Sky-Scrapers who averaged 1:56.2 flying a new ship with a NEW Ohlson 60. The ship flew well, but the motor was the sensation of the meet, developing tremendous power and showing great promise. Joe Raspante also of the Sky-Scrapers (recently a member, formerly of the Majestic Club) was third with an average of 1:48.2, flying a Berkeley Musketeer. Fourth was W. Gillette, of the South Connecticut Gas Model Club, flying a sturdy job. Dick Horton of the Metropolitan Model League flying a Struck-designed Record Hound was fifth. Sixth was Harold Henriksen with a ship of his own design. Bernie Feiner took seventh with a new Clipper. Eighth was W. Daum, of the M.M.L., with a 1939 Clipper. Carroll Moon placed ninth with a redesigned ship, and Phil Fruchtman took tenth. Henriksen, Feiner, Daum, Moon and Fruchtman are all "Sky-Scrapers."

There were fifty entrants in the contest, although the cold weather and dustiness of the field prevented many from active participation.

The Sky-Scrapers

The Brooklyn Sky-Scrapers (I.G.M.A.A. Unit No. 2) celebrated its first anniversary in December and at the same time announced the election of officers for the 1940 season. Harold Henriksen was elected President; Sal Taibi, Vice-President; George Gilchrist, Secretary and Charles Sciara, Treasurer. Retiring officers were Leon Shulman, President; Howard Beitchmann, Vice President; Saul Strassberg, Treasurer and Lou Ortiani, Secretary.

During the 1939 flying season the Sky-Scrapers participated in thirteen gas model meets, including the Nationals. In these meets they accumulated the amazing total of seven first places, eight second places, four third places, nine fourth places, nine fifth places, to say nothing of four sixths, six sevenths, three eighths, three ninths, a tenth and several lower

PROOF:

Pueblo, Colorado
February 1, 1940



Dear Sirs:

The performance record of Torpedo motor #53 has been so outstanding that I believe it only fair that I write my congratulations on such a fine masterpiece.

This motor during the past season won a total of \$60.00 cash, two trophies, 11 propellers, 8 quarts of oil and \$10.00 worth of merchandise prizes. This Torpedo powered my ship to 2 first, 2 second and 3 third place wins, among them a close second place in the highly competitive New Mexico State Championship at Albuquerque, third place in Colorado State Championship at Pueblo, second place in Pueblo City Contest and third in Denver's N.A.A. Contest.

The dependability and fine craftsmanship of this motor is emphasized by the fact that this motor has never placed lower than third in any contest in which it was entered and after the hard season outlined above the motor has never needed any major repairs and is today in first class condition and ready for the 1940 season.

Very truly yours,

Chuck Reinhard



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BULLET**
AT YOUR
DEALER'S
\$12.75



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"CHUCK" REINHARD
FOR THIS ADDITIONAL
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is UNSURPASSED

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places. In each meet there were more than 75 contestants.

In the Nationals the Club claimed second, fourth and sixth places in Class B and a second place in Class A. High individual scorer for the year was Leon Shulman, who, on a point basis (ten points for first to one point for tenth place) scored 86 points. Taibi was second with 75 points, with Gordon Murray third; Herb Friedlander, fourth and Gus Jung, fifth. Highest official time in any single flight was registered by Friedlander who turned in 17:30 o/s with a Class B ship in a meet at Trenton, N.J.

Taibi holds the Class C Gas Seaplane N.A.A. record at the present writing, while Murray holds a claim on the Class B Seaplane record.

The Metropolitan Model Airplane Council is rapidly becoming a large organization. At present it is composed of the following clubs:

Queens Aero Model Association

(Quama), Sky-Scrapers, Majestic Model Club, Richmond Model Flying Club, Metropolitan Model League, Idlewild Gas Model Club, Metcalf Aero Club, Kresge Aero Club, New York Gasolers, New York Airfoilers, Franklin K. Lane Model Airplane Club, Tru-Pitch Model Club, New York Air Screws, Silk City Model Club, Lucky Devils, Albatross Model Club, Sky Scouts, South Connecticut Gas Model Club, Flushing Model Club, Jamaica Model Club, Westchester Model Club and several others.

Council meetings are attended by the officers and two representatives from each member club. Matters of national and local importance are discussed and when votes are required, representatives confer with their clubs and return to the following meeting with supported opinions.

At the most recent meeting of the Council, the following officers were chosen for the 1940 season: President: Carroll Moon, Sky-Scrapers Club; Vice Presi-

[illegible]

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Specifications: Constant chord wing of 45" span. Easily constructed fuselage of longeron and strut type. Empennage of fixed design to insure permanent settings. Trexler air wheels on shock absorbent undercarriage.

Hi-Speed motor to power this ship only \$12.75 or only \$10.75 and your old motor.
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HOLLYWOOD HOBBIES

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dents: Henry Struck, Queens Aero Model Association; Leon Shulman, Sky-Scrapers; James Condon, Kresge Aero Club; Secretary: Sal Taibi, Sky-Scrapers; Treasurer: Al Young, Flushing Model Club.

Elmira

Here is an interesting note from Weston J. Jenkins of 660 Cedar Street, Elmira, New York, who says:

"A friend of mine, Oscar Mayes, finished a Class 'A' plane a short time ago. Anxious to fly it, he decided to try a short power glide in his large yard. To his surprise, the ship, with timer unset, curled up and away with the motor just idling. Rather than lose it, he was forced to chase it across town in his shirt sleeves (in January, remember).

"In closing, I would like to say that our Elmira Model Airplane Club welcomes new members. Sponsored by the Exchange Club, it meets every Tuesday, 7:00 p.m., at the Central Y.M.C.A. This coming summer we hope to establish a few new records. After all, Elmira, the soaring center of America, should be the ideal spot for such activities."

San Diego

Dan Kalacy, corresponding secretary of the San Diego Aeroneers, 3375 Dale Street, San Diego, Calif., writes:

"The regular monthly contest of the Aeronauts was held the 31st of December. About twenty-five contestants entered to compete for cash and merchandise awards. For the first time the meet was won by a lady flier. She was Mrs. Rae Davis flying her own ship, a Mystery Man, or as she calls it, a Mystery Maid. On its third flight the plane soared for a little more than twelve minutes. The remarkable thing about the ship's performance is the fact that only one flight was made before the contest. In other words the plane was test-flown at the meet. Everyone was glad to see Rae win as she has always been on hand trying at the contests.

"The Mystery Maid broke the winning streak by Strawn and Jones, who have taken first and second for the past three or four months. However they were right there for second and third.

"The following is the times (total of three flights): Mrs. Davis, 14:25; Don Jones, 9:22; Harold Strawn, 7:51.

"A special hand-launched glider event was staged with about 15 entrants. Times were very low, Dan Halacy placing first with 55 seconds. Paul Fream was second with a flight of 28 seconds.

"The main topic of discussion at club meetings now is the annual meet which will probably be held in April. More definite information will be had by next month."

San Bernardino

Following is an account of recent activities of the Arrowhead Aeronautics Gas Model Club of 930 Edgehill Road, San Bernardino, Calif.

"On December 3rd at 7:30 A.M. a record crowd of 4,000 watched the opening of California State Championship Contest, held through the efforts of Arrowhead Aeronautics Gas Model Club and sponsored by The Exchange Club of San Bernardino, California. One will be held each year during the week set aside as National Aviation Week and will be known as California State Championship Contest recognized by the National Aeronautical Association governing body of model aircrafts contest.

"With ideal weather for flying and over 250 entered in the contest from all parts of the state the exciting moment arrived for thrills and spills. As the contestants strove to obtain the best possible performance from their planes, a green monoplane built by L. W. Haskell of Long Beach, California, rose from the field gracefully, its tiny gasoline motor humming like a huge hornet. After 13 sec. motor run the plane glided on the air currents until flown from sight with a total time of 8 min. and 21 sec. It was later found by Haskell four miles from the field in the top of a seventy foot tree. A reward was offered if anyone would climb the tree to bring down the plane. For first place Haskell received \$50.00 and a beautiful trophy donated by a local paper company.

"Other trophy winners were: Abrenia Santiago of Los Angeles, second, who received a trophy donated by Maurice Fletcher of Los Angeles and \$25.00; John Drobshoff of San Francisco, third, received a trophy donated by the Exchange Club and \$15.00; Bill Brodbeck of Compton, fourth place, received a trophy donated by the Arrowhead Aeronautics Gas Model Club and \$10.00. All winners ranking fifth or lower received articles of merchandise, ranging from complete motors to tiny parts.

"Official directors of the contest were: Mr. John Bunch, N.A.A., contest director and representative; Dr. Ben D. A. Mian, president of the Exchange Club, general chairman; Lawrence J. Kelley, assistant director and chairman; and the March Field officers, who were official timers and judges. Tom Truelson of Los Angeles served as commentator of the P. A. system. National Aeronautics Association of the National youth group from Los Angeles attended the contest and aided in policing the field.

"The triple win trophy donated by the

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San Bernardino Chamber of Commerce for the club having the most winners in the first ten places went to Los Angeles Gas Model Club for one year.

"The club extended thanks to the local police department for their services as taxi for those who thumbed their way to the meet.

"The contest came to a close in a true sportsman manner around 4:15 p.m. with Haskell's plane still up the tree."

New Canaan

Charles H. Coe of New Canaan, Conn., sends us a report of activities of an outstanding club in this vicinity.

The Southern Connecticut Gas Model Club held their first annual inter-club meet on their local field in New Canaan, Conn., on Sunday, November 12, 1939. There were 68 models entered which performed to the pleasure of about 1,000 spectators including Mr. Albert Lewis, an official of the Model Division of the National Aeronautical Association from Washington, D.C. There were over \$100 worth of prizes. Mr. Whitman Wescott of Riverside, Conn., took high honors for the day, winning a silver trophy for the longest single flight of the day, the time being 2 minutes 32 seconds. Mr. Wescott won with his Thor model. Places won in this contest are as follows:

CLASS C

Time

1. Whitman Wescott, Riverside, Conn.1.29
2. John Taubl, Noroton Heights, Conn.1.233

3. Robert Campbell, Stamford, Conn., 1.23
4. Whitman Wescott, Riverside.....1.216
5. John Taubl, Noroton Heights.....1.116
6. Charles H. Coe, New Canaan.....1.08
7. Henry Struck, New York City
8. Wm. B. Gillette, Noroton Heights
9. W. Paulson, New Haven, Conn.

A & B EVENT

1. William Gillette, Noroton Heights .40
2. Phillip Klienert, Noroton Heights .306
3. Harvey Blackman, Norwalk, Conn. .28
4. J. Ogilvie, New York City.....26
5. Warren Spicer, Norwalk
6. Fred Palmer, Port Chester, N.Y.
7. Gordon Lindner, Glenbrook, Conn.
8. Arnold Hogaboom, New Canaan
9. Louis Garami, New York City

You will probably note that the times were not exceedingly high. This was due to the fact that a 15-second motor run and a three-point absolutely unassisted take-off from the ground were strictly enforced.

Jersey City

The Jersey Airsquires held a rather unusual contest last November at Secaucus Meadows, N.J., most of the members competing for the club trophy. There were other prizes consisting of gas propellers and subscriptions to magazines. The unusual part of this contest was the Marathon Event. Class B and C jobs were given a 15-second engine run; Class A jobs, 25 seconds. The idea of the contest was that the member who made the most flights of at least 45 seconds was

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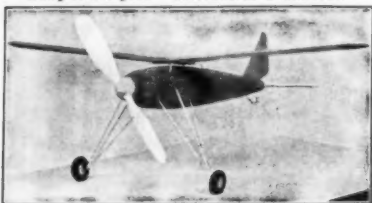
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Averages 3 min. on 20 sec. motor run—Features Retractable landing gear—Removable wing and empennage—Compact Streamlining—Conforms to 1940 N.A.A. Rules—Flying Wt. 16 oz. —Span 38½"—Climbs 1800 ft. per min.

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Span 30". Length 25". Wt. 2 oz. This new Douglas-Designed speed model has absolutely EVERYTHING you need. ALTITUDE—SPEED—ENDURANCE. perfect GLIDE and M & M Model Wheels for smooth landings. Complete Kit with M & M Model Wheels only \$1.50 P.P. "Aero-Glide" Kit complete \$2.25 Postpaid. Douglas-Designed Aeroball with Automatic Folding Prop. Span 26". Length 18". Kit Complete \$1.25. Send for Free "39" Catalog.

Send Money Orders or CASH only. When sending cash fasten coins to letter with adhesive tape. If located in Washington add State Tax.

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A new two in one endurance model landplane or seaplane. FEATURING Hexagon fuselage with shaped sides. One blade folding prop. 2 Shock proof landing gear. Detachable wing. Fuselage and landing gear. Bear claw floats. Meets N.A.A. rules. Span 34"—Length 25"—Wt. 2 oz. COMPLETE KIT \$1.50 postpaid

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1/32x3/32	.15	1x1 1/2	.37	1/32	.15
3/64x3/64	.28	1x2	.13	1/16	.18
1/16x1/16	.15	1x2 1/2	.17	1/8	.22
1/16x1/2	.50	1x3	.20	1/4	.42
3/32 sq.	.25	1x3 1/2	.24	1/2	.80
3/32x3/4	.85	1x4	.27	3/8	.80
1/8 sq.	.30	1x6	.34	1/2	.84
1/8x3/8	.80	1 1/2x1 1/2	.18	1/2	.84
1/8x1/2	.85	1 1/2x2	.20	1/2	.84
3/16x3/16	.60	1 1/2x3	.33	1/2	.84
3/16x3/8	.80	1 1/2x6	.45	1/2	.84
1/4x1/4	.09	2x2	.23	1/2	.84
1/4x3/8	.18	2x3	.32	1/2	.84
5/16 sq.	.18	2x4	.46	1/2	.84
5/16 sq.	.24	2x6	.60	1/2	.84
1/2 sq.	.30	2x8	.80	1/2	.84
1/2x1	.30	3x4	.96	1/2	.84
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18" lengths 1/2 price of 36" lengths; 60" lengths double price of 36" lengths.

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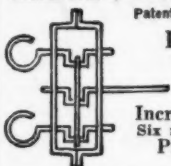
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declared winner. The weather was generally fair and warm and the contest ran from 10:30 a.m. to 2:30 p.m. Frank Ehling won first place with 19 official flights. E. Powell was second with 7 flights; W. Shea, third, with 4 flights; A. Eggers, fourth, with 3 flights. Apparently this contest was one of operating efficiency: the fellow who was most familiar with his plane, its operation and the technique of flying stood the best chance to make the most flights. Ehling, as all model builders know, is an old hand at the game and we do not wonder that he "walked away" with the contest.

Notice

Here's an item, sent to us by Clifford McBaine of Columbia, Missouri, which will startle the imagination of the wildest dreamer. McBaine says:

"And now I would like to tell my little 'believe it or not' story which happened to me recently at a contest. In the middle of activities a wing was laid on the ground and a puff of wind came along, blew it across the field where it caught a thermal and went rolling over in the air. After chasing it for ten miles south of town it went out of sight overhead—after forty-five minutes timing. This actually happened and was witnessed by many people."

McBaine ends this account like a bedtime tale, but we can vouch for his story. We now await anxiously for an account of other unusual flights of model builders.

IMPORTANT NOTICE

In addition to the motors listed in the chart that appeared in the March issue, the following engines will appear in our next, the May issue:

Aircraft Industries' "Super Cyclone," Wm. R. Atwood's "Champion," Feeney Mfg. Co.'s "4 Cycle," Miniature Motors' "Bantam," Junior Motors Corp.'s "Brownie," Ohlsson's "16" and "60" and others.

Air Ways

(Continued from page 27)

PLANE NEWS, from which Day built the model shown in the picture. He did an excellent job. Day tells us that in fair weather, when the ship is fully wound, it has a duration of over one minute on every flight. He would like to know where Struck found the original plans and details of this excellent ship, which is one of the early Caudron models.

In picture No. 4 we see the Severson P-35 built by Paul Lempke, Jr., of Dover, N.H. It won first place in the annual Hoitt and Wentworth Model Airplane Exhibition Contest. The details are complete; including a detailed twin-row Pratt & Whitney "Wasp," movable control surfaces with controls and retractable landing gear. It also includes a sliding windshield and complete cockpit details.

Joe Walsh writes us from 96 Willis Street, New Bedford, Mass., sending a picture, No. 5, of his fifty-three inch Albartross contest model with two trophies it has won. Out of three contests entered, it won two first places and a third place.

Joe has experimented consistently with high-aspect-ratio designs and finds them far superior to other types of wings. We would like to uphold Joe in his opinion; for, unquestionably, under the condition in which a wing area is limited, the proper thing to do is increase the aspect ratio of the wing. This has the effect of greater area and efficiency. Judging from the picture of Walsh's model, we would say that the design is nearly perfect. The stabilizer is large enough to be effective without being excessive. Unlike many planes it has not excessive dihedral—it is a mistaken idea to think a very large dihedral is beneficial: A dihedral of more than a certain amount does nothing but reduce efficiency. The dihedral shown on this model, we would judge, is about correct, and the model's performance justifies this opinion. Joe has made a number of remarks concerning his experiments, which we believe interesting to reprint. He says:

"I believe that super streamlined models are not quite as practical as we would believe, since the fuselage offers no resistance to side slipping or tight circling. It would appear that the ordinary rectangular or diamond-shaped fuselage has somewhat of a keel effect, aiding the model to fly on a steady course. A round or elliptical fuselage seems to act as a stick, and consequently more dihedral is needed for spiral stability; hence where there is a decrease in drag, there is a loss of lift also. I have yet to see streamlined designs prove their theoretical superiority over the regular designs. At contests they always seem to be erratic. If one is to control this type I believe it would be wise to incorporate a high aspect ratio wing (polyhedral shape) with a fairly long fuselage and large stabilizer.

"I believe the folding prop is here to stay and getting to be a real necessity. It is quite surprising to see small Class C models turn in flights that nearly equal Wakefield types. Judging from experience, the small model will be under no handicap now that the folding prop is here; the only recommendation being to

The FLIGHT LEADER

Class "A"
Model



Complete kit less liquids and
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50¢

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OVERALL LENGTH.....23 1/4"

WING AREA.....171 sq. in.

WING LOADING.....8 oz. per sq. ft.

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TOTAL WEIGHT (with motor).....10 oz.

● Removable motor mount and ignition track

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PAUL K. GUILLOW

WAKEFIELD MASSACHUSETTS

keep the model so it just about gets in the weight rule and using all the rubber it can carry."

We concur in his opinions.

Talking about scale models, glance at picture No. 6. This is enough to make a scale model fan's heart leap with joy. The picture was taken at the New York World's Fair and shows a display of models of various U.S. Navy airplanes, including the latest addition to the fleet: a huge Consolidated four-engine "Dreadnaught," shown in the center of the picture. As you might imagine, the models are perfect in all details. Those who attend the World's Fair in 1940 should not miss viewing this display.

The career of Air Youth of America was officially launched on January 23rd at a dinner given by Winthrop Rockefeller at the Rainbow Room, Radio City, New York City. Air Youth has undertaken to organize model builders and to provide complete information which will help them carry on this fascinating activity. Air Youth hopes to establish an aviation club in every secondary school in the United States.

Picture No. 7 shows Mr. Winthrop Rockefeller, at the left, talking to Edward P. Warner, member of the Civil Aeronautics Authority (center). Major James Doolittle, famous pilot and the firm friend of all model builders, listens attentively. At the dinner were celebrated personages from all walks of the aviation industry. We all look forward to the good work which this organization gives promise of performing.

CLUB NEWS

Florida

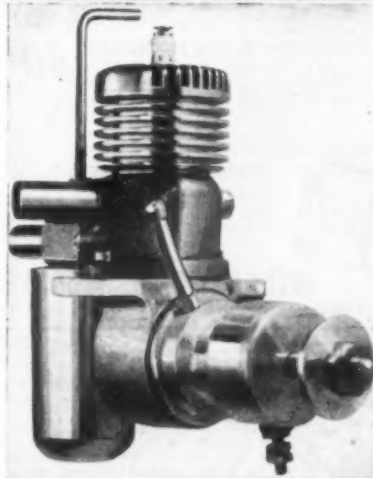
Many of you have heard the names mentioned herein, but not many have known that these names were responsible for the success of a great club named the Miami Herald Model Flyers, sponsored by Miami's largest newspaper and its aviation editor, Jack Stark.

Jack was and still is the sponsor. He at first had Earl Watson and George Magnus as his assistants. Ivan Tarbet was present; Fred Laubenthal, vice-president; Harry Gilbert, secretary and George Witmer, treasurer. All of the boys were the city's best model builders and took innumerable contest honors.

Under the above group of officers' directions a first meet was held. They had one girl member, and of course, among seventy-five male members what female wouldn't be treated royally?

As in all clubs, friction came about and the club didn't meet for a while. Soon only thirty-five members remained and a new group of officers followed their sponsors, Jack Stark and George Magnus. The new officers were: Raymond Dresskell, president; John Sturmer, vice-president; Ed McIntyre, secretary and Frank Gregg, treasurer. For a year these officers struggled, held meets and built the membership of the club to seventy-seven.

It came time to elect new officers, who were as follows: Raymond Dresskell, president; Frank Gregg, vice-president; Ila Rickel, (the only girl) secretary and John Sturmer, treasurer. The club offi-



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cers, within three months, became state-wide known. They were given a special invitation to put on a meet in Belle Glade and maybe bring an interest for model building into the minds of the boys in the city. They completed this, getting the Boy Scouts interested enough to start a club. Several other meets were held and came out with success.

Then came the annual All-American Air Races. The club got in free, and entertained at the Civilian Pilots' Ball.

Their only girl member went to California that summer and came back with eleven honorary members, including Elbert Weathers, Reginald Denny and Frank Knapp. That same summer Gene Chaille, one of the members, was on the U.S. Wakefield Team.

Recently new officers were elected: Gene Chaille, president; Ed McIntyre, vice-president; L. B. Harvey, secretary and the same two sponsors. More success came when the club went into the Orange Bowl parade and they probably will get into the Air Races of 1940.

The disasters of the club were numerous, worries plentiful, and they were financially embarrassed many times, but yet they worked. They built up a popular club, therefore let's see others do the same.

South Carolina

Jimmy Metchicas of Greenville, S.C., sends us some interesting information and news from various points in the South. He is a member of the Torque Fliers Model Airplane Club, Greenville. Several items of interest are:

"We are at present working very earnestly, completing a radio controlled gas job, after having just completed our exhibition at the Greenville County Fair, where there was \$50.00 in prize money. We are already planning our next year's contest, although it will be worked on a little different order. This year we gave \$400.00 in prizes, last year, \$60.00, and next year we are planning for \$1000.00 in prizes. Every year we strive to put on the best contest ever put on anywhere in the South. We held the first two-day contest and had the largest attendance ever anywhere in the Southlands. We have fairly good weather here with long dry spells and lots of warm weather. Right now, however, we are suffering with extreme cold, winds, etc.

"Our club originally started two years ago, with Francis Embree, president; J. C. Templeton, vice president; John Adams, secretary-treasurer. We only had eight members then, now we have 33. Officers

now are Bob Brown, president; Dewey Parks, vice president; Jimmy Metchicas, secretary-treasurer. Since then we have never failed to attend any state contests and have put on two ourselves, each time being successful.

"Our radio job will be a slightly enlarged 'Powerhouse' with one radio channel and a Denny to do the hard work. It is being engineered and built by Bob Brown, Bobby Parks, E. H. Williamson and myself; with the radio end of it being done by Dewey Parks.

"I might add that since returning from the Academy meeting, we have all junked our gas jobs we had prior to the new ruling and are all engaged in designing our own for next year. We do not plan to buy any more kits that are on the market. The same thing might happen again, one kit will monopolize the whole country and we don't want to see that happen again.

"We have the only N.A.A. club in the state, and are trying very hard to make a good name for ourselves, by going at it in a business sense, so to speak. Recently Al Lewis of the N.A.A. in Washington, appointed me Director for South Carolina. My pal!?"

Columbia Aero Midgets, Columbia, South Carolina

"The Aero Midgets are our chief rival in this state, as, like two football teams, each tries to better the past record of the other; right now we are both about even.

"They, too, are engaged in the construction of a radio job, with Ed and Fred Fetner, cousins, doing the main work. They are also planning a huge contest in the near future, with a good prize list, about \$500.00. Incidentally, Ed Fetner and myself are ambitiously trying to reorganize the South Carolina Model Airplane Association. This is an Association formed of all the other clubs in South Carolina; we all work together and share everything together. This Association was formed at our first contest here a year ago. Columbia, I might add, is a very good town for rubber flying, they really go for it there, and I would not be at all surprised to see a few records spring up from there. Also they have about 60 gas modelers.

Atlanta, Ga.—H. R. Hudson, Correspondent.

"Hank Hudson seems to have worked up a good idea on breaking the monotony of the winter lull. He and the Atlanta Aero Engineers bought a gross of various colored balloons and strung them up in a large Gym-Auditorium and let all the rubber modelers fly their planes indoors. In the wings and on the prop hubs they had stuck pins. He says that there were very many balloons busted this way. The winner was the fellow who popped the fewest. Hank has directed several excellent contests with attendances all the way up to 50 and 75. Most famous Atlanta modeler is Albon Cowles, placed 6th, at the Nationals.

Savannah Ga.; J. C. Schwarz Jr., Cor.

"This gang of modelers is very experimental; they very rarely buy a kit, they just design. They are at present experimenting

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would be covered, and along the way she would certainly have the pleasure of meeting many modelers.

"Before starting she took out her MODEL AIRPLANE NEWS magazines to locate modelers in each section of the country, and when different meets would be held so that if she stopped there at that time she could visit the meet.

"The long journey started in Miami, Florida, at 8:30 in the morning. Across the long desolate Tamiami Trail to Tampa for the first night rolled that Lincoln Zephyr. She made no effort to find any modelers until she reached Tallahassee. Her first move was to locate the newspaper office of the *Daily Democrat* and make friends with the city editor, who gave her Bill Boyd's name. Bill is the president of the Tallahassee Gas Model Flyers. They started about thirteen weeks ago with a membership of eleven. Bill has built models for three years, but has only built small gas jobs. He claims that all of the club's members are of high school ages. I went out of the *Daily Democrat* office knowing that a club as interested in getting started as the Tallahassee Model Flyers would certainly make good and someday compete against today's bigger clubs.

"I'm taking two cities at once this time because both of them have the same trouble. New Orleans and Mobile. What's wrong with these cities? The newspapers, chamber of commerce, and people walking down the street all know there are some model builders and they think they have a club, but nobody can tell you where it is and who any of the boys in it are. I think it would be a good idea for these clubs to get somebody to back them so that if any one else goes to the city for the first time they won't have to go away, after asking everyone they could find, disgusted. I wrote this paragraph in first person only to make sure it stood out from the rest of the paragraphs, and if anyone from these two cities reads this story they'll do something towards this proposition.

"Dallas, Texas, a city your writer had been wanting to see for ages. Here she had the pleasure of meeting Mr. F. W. Cale, president of the Southwestern Gas Model Association, also senior advisor of the Dallas Gas Model Association, whose purpose is to promote interest and activity in gas model building and flying. In this they will be able to contribute something to aviation. It meets every other Friday night. Their membership runs up to forty-eight with about fifty per cent of the members being N.A.A. members. The newspapers cooperate with the club to some extent, but more publicity would be appreciated. Mr. Cale believes anyone who closely combines the Gulf Stream State Clubs would be a great asset.

"Now let's jump way over on the coast to San Diego, Cal. Here we find the designer and builder of the Mystery Man, which is growing vastly popular with builders all over the world. Elbert Weathers invited me to the San Diego Aeronauts meet. At the meet your writer was given a pass permitting her to go out to the motor-start-circle at any time she desired. Elbert is known as Joe by his close friends and is corresponding secretary of the Aeronauts club, whose purpose is dedicated to the advancement of aviation. They meet every other Thursday night. Their membership

rates 70, including four girls. The club has applied for an N.A.A. charter, and at present has ten N.A.A. members. The Aeronauts sure know how to run a meet. Each contestant is given a number and are called to the motor-start-circle by their number. Ten ships are called to the circle at a time, where their planes are weighed and they have a choice of ten timers. A telephone system from the circle to the announcer's truck makes it quite convenient to keep the audience posted as to who the owner of the ship taking the air is and the time the ship makes.

"Los Angeles—all the modelers seem to center their activities here. Your writer met Mr. Schrott of Reginald Denny Ind., and found him a likeable person. He took up his time to show her around the shop and to explain to her sister things that puzzled her greatly. The president of the Gas Model Airplane Association of Southern California is Jim Williams, senior advisor is Mr. F. B. Knapton. Mr. Ohlsson showed your writer the Ohlsson motor shop, and showed her several things about the motor she never knew."

The 1940 Scripps-Howard Air Races will be held in Akron, Ohio, at the large Municipal Airport, home of the Goodyear Zeppelin hangar and scene of the Scripps-Howard Junior National Air Races for the past two years. Events to appear in the program will be definitely announced shortly but will include stick, fuselage and speed contests. The Goodyear hangar will be available to contestants for indoor flights unless government work prohibits its use.

Frank Andrews of 784 High Street, Fall River, Mass., says that from what he has read many of the clubs in this country are going to hold contests especially for Wakefield models. Therefore he suggests that fellows check back in their files and build some ships of this type, as they may need them during the coming season.

We hear that in the last contest held by the Stix, Baer & Fuller Model Airplane Club, St. Louis, Mo., at the Merchants Exchange Auditorium, Bob Gibbs unofficially broke the world's record for Junior Helicopters. His "mic"-covered ship flew for 2 minutes, 35 seconds. John Liable's Class B tractor flew 11 minutes. Another news item comes from St. Louis:

Aeronauts developing tailless designs! The "nuts" have been quite successful in designing flying wings. Zaiser, Ely, Veselsky and Lambros have developed very stable flying tailless gliders. Some have sweep-back and the others had triangular wing form. The boys are going to eventually come out with a practical gas model. A tailless model should be very efficient and exceed the present flight times. After reading several articles in MODEL AIRPLANE NEWS by Hans Meier about German tailless gliders and soarers we got the idea to do some experimenting ourselves. Watch for that tailless gas model!

England

George Whitfield of Earsdon, Northumberland, England, sends us some news from his "corner of the globe." Though to some extent activity in the model airplane field has been affected by world conditions, the Newcastle Model Aero Club, of which he is a member, is going ahead as best it can. He tells us he recently finished the con-

struction of a "Flying Midget Gas Model" from plans in the August, 1937 issue of *MODEL AIRPLANE NEWS*. It is his third gas job and he says he built it because of its small size and super-climb, since he has "to go easy" with gasoline. At present Whitfield and a number of club members are building scale models for use by army for instruction purposes.

Models for Money

I. Mari Rickel of 3127 SW 21 Street, Miami, Florida, sends us a note of an interesting incident which took place recently in her home-town:

Johnny Fine went home one evening after school and secured some bright red paper. He cut out letters to spell "Mile of Dimes," which was a drive to secure money for milk to give underprivileged children on Christmas. Then Johnny secured two pieces of string, tying the ends to his plane and fastening one string to the top of each letter and the other to the bottom. After he had done this he tied the two pieces securely to the last letter, thus finishing his streamer. Next addition to this list of material was two firecrackers, which had been left over from the Fourth of July.

His plane all ready to go, Johnny got his bicycle and rode down to the newspaper office where the six-weeks drive was about to start. Johnny asked permission to inaugurate the drive, which was granted. He started his gas engine, lit the firecrackers that were tied to the ends of the streamer and sent his plane into the air with a double bang that caused everybody to look. When they looked up and saw this tiny midget taking to the air with a streamer on the back reading "Mile of Dimes" everyone laughed wholeheartedly. By this time the drive had started, with everybody on the street reaching into his pocket. The day's profit was five hundred dollars!

Johnny's picture was put in the paper with the result that soon after model planes were in demand by many merchants for advertising purposes.

Questions and Answers

Question: Do all American commercial planes have to hold a certificate of airworthiness?

Answer: Yes. The Department of Commerce must pass on the airworthiness of every ship before it is granted a license.

Question: What percentage of the wing area should the stabilizer area be? The rudder?

Answer: On a gas model the stabilizer may have an area equal to one-fourth of the wing area and yet have it exceedingly stable. We suggest, however, that an area of 33% of the wing area be used. This will increase the stability of the model, without causing the stabilizer to be excessively large.

The fin or rudder area should be 7% of the wing area. If it is larger than this the model will have a tendency to dive when banking in a turn.

Thomas Guilfoyle of 133-05-140 Street, South Ozone Park, New York, writes and asks for some information.



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New York, N. Y.

Question: Why is it that a high degree blade angle prop never performs as well as a low or medium degree one?

Answer: This is an entirely false assumption. A high degree blade angle prop can be made to perform as well as a low one if the propeller is properly designed to meet the conditions demanded of it by the model which it is pulling through the air.

A common fault of model designers is that when they use a propeller with a high pitch or a degree of blade angle, they do not give the blades sufficient area. Because of this excessive slip is produced and the torque is large. If the blades have enough area the propeller with a high blade angle turns very efficiently. It also has the advantage of allowing more rubber to be installed in the model and thereby obtaining greater duration.

Another factor which may cause the trouble encountered by Mr. Guilfoyle is that he may not be putting enough rubber on the propeller. We might say it is easier to get performance with a low degree blade angle because it requires added knowledge to attain efficiency with one of high degree.

Question: What causes a twin pusher to veer sharply to the left until it hits the ground?

Answer: This condition usually is produced by the fact that the front plane has too little area and dihedral angle relative to the dihedral and area of the rear wing.

That's all for this month!

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Fundamentals of Model Plane Design

(Continued from page 19)

to measure it at the blade tip. Fig. No. 22 shows an end view of a propeller. The line XY is the axis. AB is the cross section of the blade at its tip. Line AM is the plane of rotation perpendicular to axis XY and to the plane of the paper. Then the blade angle in this case is angle BAM.

In one revolution of the propeller the tip of a blade will describe a circle, the length of the circumference of which is 3.1416 times its diameter, or $\pi \times D$. This, then, is the distance traveled by the blade tip in a sideways direction, AM. Lay out this distance on line AM. Let M indicate the point on the line, this distance from A.

Now extend line AB. As the propeller revolves and screws itself forward, AB extended, represents the path it will follow if its spiral path is laid out in a straight line. From M draw a line perpendicular to AM until it intersects line AB extended at N. Then line MN represents the distance the propeller will move forward in one revolution and it is therefore the theoretical pitch of the propeller.

Now it is not difficult to see that the blade angle has a great deal to do with the pitch of the propeller. If the blade angle is larger than angle NAM then the line MN will be longer and the pitch greater. The pitch will be less than distance MN if the blade angle is smaller than angle NAM.

Also it is apparent that the pitch will be larger if the blade angle is NAM as shown, but the diameter is greater. As an example, suppose that the diameter is greater and the blade tip generates a circle equal in length to AZ. A line perpendicular to AZ at Z will intersect AB extended, at Z'. Then ZZ' is the pitch of the propeller with the larger diameter.

Consequently for any given diameter,

the pitch is proportional to the blade angle, or vice versa, to the diameter for any given blade angle.

The blade area of a propeller is the sum of the areas of all the blades: (area of one side of the blades). The area of any one blade is the area bounded by its outline and the axis of the propeller. If the propeller is completed, the blade area may be determined by measuring the actual proportions of the blades and calculating the area from these. First measure the width of the blade at about ten points equidistant from one another, along the length of the blade. Add these and divide by ten. This will give the average blade width. Multiply this by the length of the blade (one-half the propeller diameter). The product will

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1940 GWS catalogue lists "Everything for Gas Models." Airplanes—Boats—Race Cars—Motors—Supplies. Gas Model Specialties, 153 W. Washington, Syracuse, N.Y.

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be the area of one blade. The total blade area can be found by multiplying the single blade area by the number of blades in the propeller.

Blade Cross Section Defined

The cross section of the blades is the next factor. This may be defined as the outline form of the blade measured parallel to the chord of the wing. It is equivalent to the cross section of a wing. However, in the case of a propeller, it varies in shape at each point from the hub to the blade tip.

Blade Shape Defined

The blade shape is the form of the blade established by its outline. Some blades are wide at the center and narrow at the tips, some have wide, rounded tips and others may even have straight sides and ends like many propellers used in early pioneer days of aviation development.

Determining the Correct Characteristics of the Propeller

Now that we are acquainted with the nature of the factors that are involved in designing a propeller, their correct values can be established for the model we are designing; your first powered model plane.

These factors cannot be given just any value if the plane is to fly efficiently or, in fact, fly at all. The value of each one of them will depend upon the proportions and the desired performance of the model. Their correct values may be determined readily by the application of a few simple rules.

First the correct diameter must be determined. The rule is: Make the diameter equal to from 1/3 to 1/2 the wing span. Contest models should have very large propellers in order that they can turn slowly and yet deliver a great deal of power. Such propellers are not suitable for practice models or those to be used for general flying, however.

Large diameter propellers have a tendency to create instability and make flight adjustments difficult and critical. Therefore, comparatively small diameter propellers are advisable on the type of plane being designed. Such propellers turn faster and pull the model out of critical situations occurring in flight more readily than large ones.

A diameter of 1/3 the wing span will give the plane fine flying qualities. The diameter can be made slightly larger than this amount with good results. The span of the wing is to be 22 inches. One-third of this is 7-1/3 inches. This is an odd size, and inasmuch as the diameter can be a little larger than this, a diameter of 8 inches will be selected.

What the pitch of the propeller should be is the next consideration. The larger the pitch, the slower the propeller will turn and the greater the duration will be. However, the amount of pitch is determined by the blade angle. If the latter is very large, the torque of the propeller will be excessive and the propeller will not operate efficiently. The most efficient blade angle for various types of flying conditions, take-off, climb and windy weather, is one which produces a pitch of about 1-1/2 times the diameter.

Therefore for any given diameter the

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the power packed "C" class motor that has everything. It is not power alone, however, that makes it the outstanding "C" class motor. The experience of years devoted to miniature motor manufacturing, plus constant improvements, give you a really fine motor. Ball bearing crankshaft? Transparent gas tank? Enclosed timer? Lo-Ex alloy piston? Piston rings? Micro-fine gas adjustment? High compression? Bronze bushed connecting rod? Tubular steel wrist pin? Counter-balanced crankshaft? Easy starting? Smooth operation?

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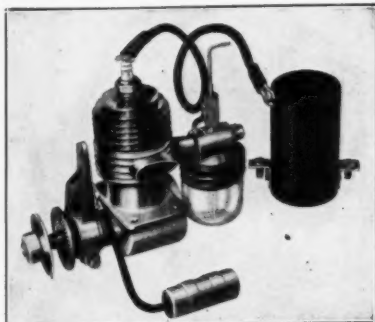
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pitch should be a definite value. One way to increase the pitch without loss of efficiency is to increase the diameter. However, the diameter should not be larger than specified for reasons given above. Where duration is the main objective the pitch may be as large as twice the diameter. The only advantage in making the pitch less than 1-1/2 times the diameter is for quick take-off. With low-pitch propellers, planes can be made to fairly jump off the ground, while planes with propellers of high pitch require considerable "run" before they leave the ground. For quick take-offs and excessive tractive power for steep climbs the pitch may be as small as the diameter. This, of course, refers to rubber powered models and not to gas models in which the engine speed has a great deal to do with the required pitch.

Average conditions are to be met in the case of the plane being designed; therefore the best pitch for the propeller will be one which is about 1-1/2 times the diameter. This will be equivalent approximately to 1/2 the length of the blade tip circle. The diameter of the propeller is to be 8 inches. Therefore this circle is:

$$\pi D = 3.1416 \times 8 = 25.133$$

inches in length. The pitch, then, should be, 25.133, or 12-9/16 inches.

As a rule, model builders do not realize the important part the blade area plays in the performance of a model. Too little blade area will kill the flying characteristics of a plane to a larger extent than any other single factor. It will cause excessive propeller blade "slip" and torque. When climbing, the propeller will churn the air and give insufficient thrust to pull the plane up the "air grade" in an efficient manner. On the other hand, too much blade area will not harm the performance greatly, except when the plane is gliding. Then it will cause excessive head resistance.

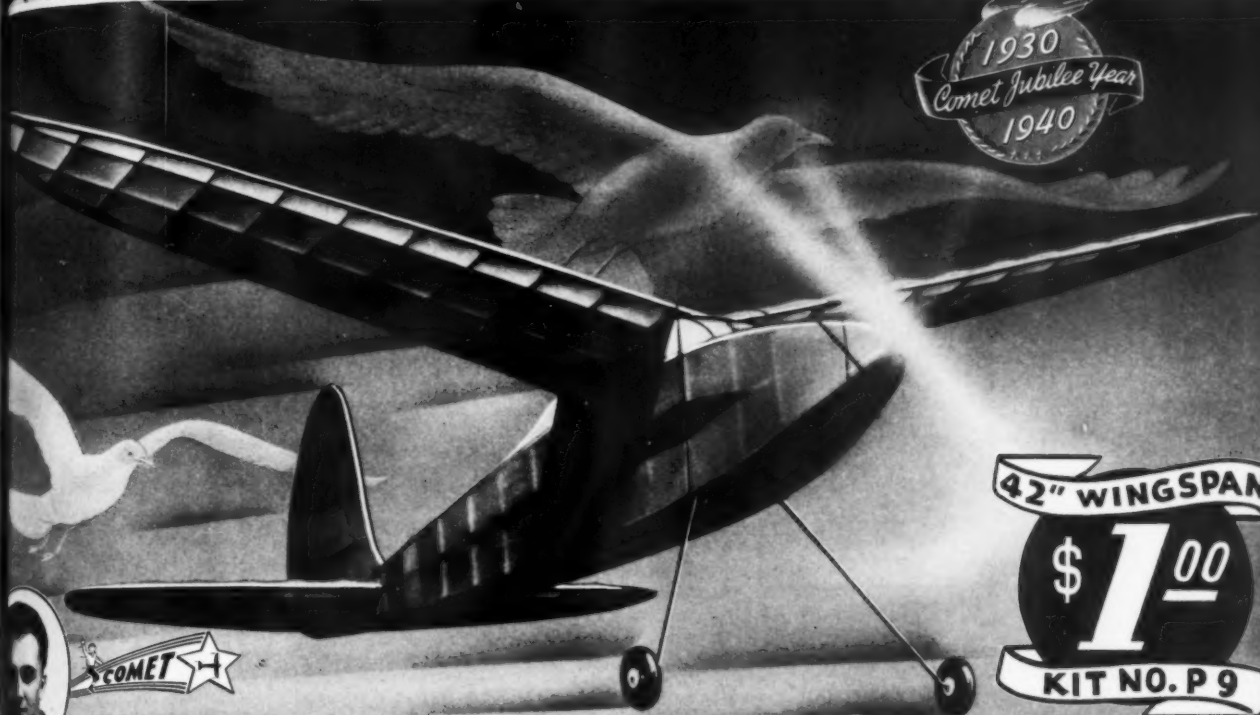
It may be stated as an axiom that the possible angle of climb of any plane will be proportional to the propeller blade area. If the blade area is small the model will not climb well regardless of the amount of power applied to the propeller.

If the blade area is about 4-1/2 per cent of the wing area, it will be just about sufficient to propel the plane in level flight without climb. For a medium climb (about average) the blade area should be about 12 per cent of the wing area and not less than 10 per cent. An increase in the blade area up to 25 per cent of the wing area will give increasing angles of climb.

The average condition will be about right for this plane so the blade area should be equal to 12 per cent of the wing area. The wing area is 60 square inches; thus the propeller blade area should be $0.12 \times 60 = 7.2$ square inches.

Next month the blade cross section and outline will be considered, and it will be explained how a propeller with the specified characteristics can be created. Until then, Happy Landings.

unveiling COMET'S JUBILEE SURPRISE No. 3



42" WINGSPAN
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KIT NO. P 9

*Why I
Designed the
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STATEMENT BY
CARL GOLDBERG

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In correct this condition, it was necessary to have a flying model with a big wingspan and excellent flying qualities—and simple to construct. After much testing, I found the answer in the ship which now bears the name of the Comet GULL.

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